INDIA RUBBER WORLD AND ELECTRICAL TRADES REVIEW

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Contributions: Of a technical nature suited to the purposes of this paper, will be liberally paid for if accepted. Correspondence relating to Rubber, Gutta Percha, Celluloid, Asbestos, etc., or any of their practical applications, is cordially invited, and the co-operation of all who make a study of these specialties either a pleasure or a duty is earnestly desired. All communications must bear the name of the writer solely as a guarantee of good faith.

Catalogues: Price Lists; Circulars; Reports of Meetings; early notices of changes in firms or corporations; views of factories, for office display; news items, particularly relating to new specialties; and local newspaper clippings (with endorsement of name and date of paper taken from), will be cheerfully received and fully acknowledged.

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The Conquest of America by British Capital.

IN the olden time it was the proper thing for strong nations to send out armies, and by their force of arms to take possession of a neighbor's interests, and thereafter to exact tribute. It was a manner of procedure which had its disadvantages in that it occasioned much discomfort to the wives and children of slaughtered husbands and fathers, and also involved the destruction of many industries through fire and famine. To-day, conquests are more readily attained in a quieter way, without danger to life and limb and without causing the slightest uneasiness to the insurance companies. This peaceful style of conquest is perhaps carried on by the British more than by any other nation, and consists of the capture of great industries by purchase, the field at present over which this army of capital is marching being the United States.

The first fortress that was assaulted or that had a breech made in its walls, was the brewing interest. Although not completely carried, the enemy (?) gained entrance and are so securely entrenched that it will be a hard matter to dislodge them. Then the flour business was attacked, and some of its strongholds capitulated. After this the victorious battalions of English sovereigns surrounded the fastnessess of the cheese factory, and there their success was complete.

The last aggression that comes to us over the palpitating wires, is that the invaders are surrounding the Rubber Mills: and so successful are they in prosecuting their siege, that signs of capitulation are already to be seen. While we write a courier comes in, his boots covered with dust, the fatigue of a hard ride in the cars visible on his face, with the news that one of the largest of the rubber shoe factories is invested, and will soon pass into the hands of the invaders.

As has been chronicled in the daily papers, the city of Trenton as far as its rubber mills are concerned, is in a state of complete siege. The general of the foreign force, who bears the title of Representative of the English Syndicate, and who marshalls an army of three hundred and fifty million dollars, is even now giving to them his ultimatum. It is something like this: that the eight mills in Trenton shall pass into the hands of his masters; the vanquished being allowed to bear away purchase money dependent upon the amount of earnings shown upon their books. The heads of departments, and especially the management of the mill will be allowed to remain, but shall be salaried officers of the Syndicate. About two million dollars will be paid to the owners in case they agree to the terms, and the works will run on as usual.

Whether this will be accomplished by the victorious British is still an open question. There are those among the Trenton manufacturers who realize that they have a most valuable property in their well-equipped mills, and they will naturally show considerable fight. In any case, as the victory is to be bloodless and one to which no member of any peace society could object, it is not a matter for serious alarm. There is plenty of room in this broad land of ours for the armies of peace, and when the union of the great English-speaking races is an accomplished fact, whether it is British capital in America, or American capital in Canada or Australia, it will be all one, and will redound to the glory of the aggressive Anglo-Saxon race.

—The Gossamer Manufacturers' Association has just been organized in Boston for the purpose of advancing the interests of the gossamer industry, and is to hold regular monthly meetings hereafter. The officers are: L. D. Apsley, President; A. W. Loring, Vice-President; S. Klaus, Treasurer; Warren M. Hill, Secretary; the Executive Committee being Messrs. A. Randolph, S. L. Gillett and J. A. Churchill. The membership already embraces the Boston Gossamer, Goodyear Gossamer, American, Metropolitan, Standard, Stoughton, Columbia and many other companies.

—The first of a series of very interesting articles by Dr. F. Wilhoft, on the cause of the deterioration of steam vulcanized india-rubber and its prevention, reaches us too late for publication in this issue.

—In the "Annual Statistics of Manufacturers," just published and kindly transmitted us by Mr. Horace G. Wadlin, Chief of the Massachusets Bureau of Statistics and Labor, we find that, of the rubber establishments making returns, fifteen report an increase in the value of their product from $3,290,717 in 1885 to $4,413,283 in 1886, and to $4,957,214 in 1887, while, during the last two years under consideration, the proportion of business done in the rubber and elastic goods industry has risen from 75.27 to 77.53 per cent. upon

an increase in the amount of capital invested from $3,445,419 to $4.277,032, and an increase in the value of stock used from $2,583,968 to $2,670,878.

—Special attention is directed to the important statistics showing the imports and exports for the United States of india rubber and gutta percha, appearing on page 43. These will be followed in due time by tables of United States exports and re-exports, both by countries and by customs districts, for the two years ending June 30, 1888.

—The amount of fire hose in use in the United States was recently estimated by the *Scientific American* to be as follows: Cotton, 2,766,250; rubber, 1,777,000; leather, 346,650; linen, 259,550; unclassified, 469,750. Total, 5,619,200 feet.

—The latest report from U. S. Consul-General Way shows the Russian imports to have included during 1888, 206,000 poods of india-rubber, gutta-percha, and other gums, valued at 3,300,000 roubles, as against 196,000 poods, worth 2,300,000 roubles, in 1887.

—At a meeting of representatives of the Rubber Industry, held Friday, November 8th, in the Governor's Room, New York City Hall, for the purpose of appointing a committee to solicit subscriptions to the $5,000,000 Guarantee Fund of the proposed International Exposition of 1892, the following named gentlemen were selected: Amadee Spadone, President Gutta Percha and Rubber M'f'g Company; William H. Aoken, President New York Rubber Company; Charles R. Flint, Treasurer New York Commercial Company. Up to the time of going to press, the following subscriptions had been reported: New York Belting & Packing Co. (1st sub.), $1,000; Hodgman Rubber Co., $5,000; Meyer Rubber Co., $5,000; Gutta Percha & Rubber M'f'g Co., $5,000; Seabury & Johnson, $10,000; New York Commercial Company, $3,000; Charles R. Flint, previous subscription, $2,000.

—The following bit of information is making its rounds of the daily press:

The Mexican Government has granted a concession for rubber tree culture in the State of Oaxaca, paying three cents per tree planted, and permitting the free entrance of all needed machinery and appliances. The concessionnaires must plant one million trees the first year, and each succeeding year one million and fifty thousand, till fifteen million are planted. A company with a capital of one million dollars is to be organized to carry this concession into effect. Six years are required for the rubber tree to come to maturity, after which the yield of rubber is steady.

If these statements be true, there is certainly a demand in Mexico for rubber plants, and we can be absolutely certain that certificates showing that the last one of them has been planted will be promptly filed and the money paid over. But will the plants grow? And if they do grow, will they produce rubber or scandal? Perhaps the organizers of this company can enlighten us.

A Bit of Information.

A FACT which in the rush of our busy American life had escaped our attention, is chronicled by our esteemed London contemporary. It is in effect that American ladies have a habit of chewing little rubber balls, and that forty-two of our rubber factories are in the business of supplying them. Reflecting upon this item, we cannot but be impressed with the magnitude of the work that these ladies are doing for the manufacturer, so much so, that we feel like extending our thanks personally to each of this great army of feminine masticators.

Forty-two factories! A reasonable estimate of the number of presses in these mills, for the balls no doubt are moulded, would be, taking five for the average, two hundred and ten. Each press turning out two heats an hour, would mould at least one hundred balls in ten hours; the number finished would be one thousand, and the days' work of the two hundred and ten presses would be *two hundred and ten thousand balls!* or a yearly production of *sixty-three million balls.*

No doubt the sudden rise in the price of Para is due in part to this remarkable state of affairs. And yet, when we think of it, there is no reason that "Para" rubber alone should be used. That might indeed be the choice of the aristocrats for daily use, with perhaps a fine quality of "strip" for parties and balls. Without doubt, the young girls and the nuns will prefer a dainty wod of "Virgin," while the busy telephone girls will be perfectly satisfied with "Central." Among the colored ladies we shall expect to hear that "Negro-head" is in great demand, and also that "African Ball" is not spurned as unpalatable. For the sewing circle there can be no possible objection to "Thimble," and even "Flake" may go with the upper crust.

After serious thought, in the light of this information, which we acknowledge with thanks, we have decided to go into the rubber shoddy business. What could be more delightful than to go up and down the length and breadth of the land, gathering up the balls that have been chewed and cast aside? Think of a bale of them, full of the marks of dainty teeth, redolent with the scent of perfumed breath! Yes, we *will* go into this alluring business, and we predict that when the 63,000,000 a year goes through our rubber paradise and is turned into recured rubber, that we shall have become the envy of every rubber man in existence.

What they Say of Us.

OF the many kindly expressions that have been showered upon us since the publication of our last number, we append a few extracts, just to show the spirit of friendliness and appreciation that our enterprise inspires:

From the New York Tribune.

THE INDIA RUBBER WORLD is the title of a handsomely printed magazine, the first number of which has just been published in this city. It is devoted to the manufacture and use of the various applied forms of caoutchouc, gutta percha, asbestos and celluloid, and also to the numerous uses of electricity. Besides much matter of value to the trade, it contains historical and descriptive articles of interest to the general reader. It bears the marks of careful editing, and its general appearance is that of a good thing that has come to stay.

From H. H. Tyer, President Tyer Rubber Co.

I like your paper. It will fill a void if it keeps up as it is now.

From the St. Louis Shoe and Leather Gazette.

THE INDIA RUBBER WORLD AND ELECTRICAL TRADES REVIEW, published at New York, is the latest addition to the ranks of trade journals, and a very creditable addition, too. It begins life with a most encouraging advertising patronage, and as the field it has entered is almost boundless, there is every reason to believe that the able editorial management displayed in the first number will advance it rapidly on the road to success. But one objection can be

found, and that is the length of its title. It would require india rubber lungs of great elasticity to pronounce it all in one breath.

From the Chicago Journal of Commerce.

A new monthly trade journal has just appeared in New York city —THE INDIA RUBBER WORLD AND ELECTRICAL TRADES REVIEW— devoted to the application and development of caoutchouc, gutta percha and allied industries, celluloid and asbestos. The first issue, for October 15, is a comely quarto of over 40 pages, replete with useful and entertaining information relating to the specialties with which it deals. With the advantages it possesses it deserves to prosper.

From the Mason Regulator Co., Boston.

Have already had several inquiries from "ad." in your paper.

From Fitzhugh Smith, 60 Cortlandt St., New York.

I received the initial copy of THE INDIA RUBBER WORLD, and have been much interested in the perusal of its pages. I trust your journal may have a large circulation and be widely read.

From H. O. Canfield, Bridgeport, Conn.

Am much pleased with the paper; "ad." is O. K. Have had correspondence from Omaha already, asking prices, etc. They mentioned your paper.

From H. C. Corson, Treasurer B. F. Goodrich Co., Akron, Ohio.

I have seen THE WORLD, and we have subscribed for it. It certainly is a very bright paper. Your Trade Notes especially, in matter and style, bear evidence of an expert's hand.

From C. F. Hamilton & Co., Albany, N. Y.

We enclose herewith subscription to INDIA RUBBER WORLD. We wish you great success.

From the Cleveland Rubber Co.

We have received sample copy of your journal and like its appearance very much. Please add our name to your subscription list, and advise us concerning your advertising rates.

From A. T. Holt, Akron Rubber Co.

Your admirable paper came to hand yesterday, and I think it a credit to its originators, and predict for it great success. It will be of value to a large class of rubber men, and should be read carefully by the heads of all departments. Please enter my name as subscriber for one year.

From Knowles Steam Pump Works.

We are very much pleased with the appearance of your first number, and trust you will make it a success.

From W. D. Allen & Co., Chicago.

We received a copy of THE INDIA RUBBER WORLD, and you may send us the same here for one year. We like your paper, and we wish you success in your new enterprise.

From Cooper Union Library.

I have received by this morning's mail THE INDIA RUBBER WORLD, for which I beg you will accept the thanks of the trustees. As we have during the winter a daily average of 2,000 visitors, I think you would find it to your advantage to have your journal represented here. If you feel disposed to donate a copy regularly, I should be most happy to place it on file, and as we have nothing in the india rubber line, I feel certain that it would be very largely read and greatly appreciated both by the trustees and by the readers themselves.

From M. Dittenhoefer, of Sonneborn Rubber Comb and Novelty Co.

I congratulate you on the issue of THE INDIA RUBBER WORLD, and wish you success.

From Edred W. Clark, Hartford, Conn.

I am very much pleased with the paper, and have read every thing in it, even all of the advertisements. I think it contains valuable information for all in the rubber business, besides much of interest for others, and I shall preserve every number. I have also received inquiry for presses through the advertisement from a party I never heard of before, and they mentioned your paper.

From A. C. Cattell & Co., Cincinnati, Ohio.

Enclosed you will please find subscription for a year for THE INDIA RUBBER WORLD, and permit us to assure you that we have long felt the need of such a journal. Please kindly advise us your rates of advertising and the most desirable spaces you have vacant. We wish you every success in your new enterprise.

From Geo. B. Hodgman, Secretary Hodgman Rubber Co.

I like the paper immensely, and I think it will pay both you and your advertisers.

From W. H. Whitehead, Lake Shore Rubber Works, Erie, Pa.

The advantage that you have over all other papers as an advertising medium for rubber manufacturers, is that you represent the rubber trade specially. Good luck go with you.

From Benj. R. Western, Manufacturers' Advertising Bureau, N. Y.

The paper is a pleasing surprise to me.

That same thought, "we have long felt the need of such a journal," has been expressed to us over and over again, and it does us good. We are glad that there was a need, but we are far more grateful that our friends in the rubber trade assure with such sincerity that our paper fills the void.

Distinguished Visitors at the Para Rubber Works.

WHEN the Pan-American delegates were in Massachusetts they visited, among other industries, the plant of the Para Rubber Shoe Company at South Framingham, and have since alluded to it as one of the most unique and delightful of the many calls they made.

A special train bore them from Boston, or more accurately from West Newton, directly to the mill, their escort being the president and treasurer of the Para Rubber Shoe Co., Mr. T. F. Coolidge and Mr. J. H. Stickney, together with the treasurer of the Boston Rubber Shoe Co. and the presidents of the American and Woonsocket Rubber Companies.

At the factory the guests were met by a great gathering of the townspeople, and a very pretty ceremony of welcome was gone through with, in which little children pinned on the coat of each visitor a beautiful boutonniere. The selectmen of the town, through their chairman, then presented the delegates with a handsomely engrossed set of resolutions in English, Spanish and Portugese.

The next thing in order was the examination of the factory, and it was at once entered upon with marked interest, the party being led by Superintendent Thomas. Through the washing, drying, mixing and calender rooms, each process being clearly explained, they passed to the cutting rooms and from there to the making-up rooms, where of course the majority of the large force of hands are employed. After seeing the shoe made they saw it varnished, and run into the heater for vulcanization—but being informed that the latter process took seven hours they concluded not to wait to see the end of the cure. On their departure the visitors were each presented with a tiny pair of dolls' rubbers as souvenirs to take to their Southern towns. The delegates on taking their leave were lavish in their expression of gratification at the treatment they had received, as well as their admiration for this most successfully conducted and perfectly equipped mill.

Saturday Half-Holidays and Full Pay.

FOR the past three years the Hodgman Rubber Co. have closed their factories at Tuckahoe and Mt. Vernon at three o'clock Saturday afternoons, granting to the employees full pay for these shortened days. That this generous consideration was appreciated by the men, was proved by the presentation to the President of the company of a very handsomely engrossed copy of preamble and resolutions, as follows:

WHEREAS, For the past three years we have enjoyed the privilege of closing at three o'clock on Saturdays throughout the year, without reduction of pay; which arrangement we consider far more to

our advantage than Saturday half-holidays for the three summer months only; and

WHEREAS, We highly appreciate this generous consideration of our interests on the part of our employers; it is therefore

Resolved, That we tender to Geo. F. Hodgman, *President;* Charle A. Hodgman, *Vice-President*, and George B. Hodgman, *Secretary*, our most sincere thanks for the kind and liberal treatment thus manifested toward us.

Resolved, That a copy of this preamble and resolutions be suitably engrossed and presented to the Hodgman Rubber Company.

Committee:—John Monaghall, John A. Riley, Thomas A. Irwin, George H. Geisler, John P. Cannon, John F. Staab, William Elliott

In reply, the Company sent to the committee the following acknowledgment, dated October 14th:

It is with pleasure that we acknowledge the receipt of the resolutions adopted by you June 26th, 1889. It is indeed gratifying to know that you have shown yourselves appreciative of our efforts to make your labors as pleasant as is possible; for it has always been our aim to advance the interests of our employees in all that is just and equitable; and harmony between employers and employees is best promoted and a larger result obtained wherever the mutual interests of both is the prime consideration. Time that is devoted to recreation and rest tends to make the return to labor more pleasant, and thus indirectly make better workmen of those who are thus benefited, and we trust the harmonious relations whose existence is expressed in your resolutions may always continue for our mutual good. HODGMAN RUBBER CO.

Geo. F. Hodgman, *President;* C. A. Hodgman, *Vice-President;* G. B. Hodgman, *Secretary.*

U. S. Government Awards.

THE India Rubber Comb Company were the successful bidders for the supply of 1,000 dozen small and 500 dozen large rubber buttons to the Navy Yard, at New York City. Their bids were respectively 4¼ and 22½ cents per dozen, as against 4½ and 24 by Joseph Wecksler, 4 13/16 and 24½ by Henry C. Harper, and 4 15/16 and 25 7/16 by R. A. Robbins, of N. Y. City.

For Marine Hospital Service, the following were the successful bidders:

CHAS. T. MAX & CO., Chicago, Ill.:

Rubber Bandages, Martin's, 2½ in. by 15 ft.	$33.50
Rubber Bandages, Martin's, 3 in. by 18 ft.	42.50
Rubber Gloves, Nos. 11 and 12	$9.00 and 10.00
Rubber Ear Syringes, soft	2.56

HAZZARD, HAZZARD & CO., New York:

Rubber Catheters, soft, velvet eye, English	15.00

SHEPARD & DUDLEY, New York:

Rubber Fountain Syringes, Nos. 2, 3 and 4	14.40

W. H. SCHIEFFELIN & CO., New York:

Rubber Air Cushions, round open center	7.50
Rubber Air Cushions, Bed pans	10.00
Rubber Crutch Tips, assorted	2.50
Rubber Urinals, H. R.	96.60

SEABURY & JOHNSON, New York:

Gutta-Percha tissue, 1 yd., 10 yds.	$2.50 and 3.50
Rubber Tubing, black, ¼ inch	4.50

WILLIAM A. WHEELER, New York:

Rubber Plasters, adhesive, 1 yd., 6 yds.	1.40
Rubber Plasters, adhesive, 5 yds., 500 yds.	60.00
Rubber Sheeting, white, 54 in.	137.50
Rubber Sheeting, black, 54 in.	28.50

RIDER & ADDISON, Washington:

Rubber Syringes, H. R., 6 oz.	4.00

MCKESSON & ROBBINS, New York:

Rubber Syringes, H. R., 12 oz.	5.45

LESLER'S MFG. CO., Bloomfield, N. J.:

Rubber Tubing, black, ¼ inch	14.00
Rubber Tubing, black, ⅜ inch	17.00
Rubber Tubing, black, ½ inch	5.00

In the Rubber Worker's Laboratory.

II.

SULPHUR—SULPHUR CHLORIDE—CARBON BISULPHIDE AND OTHER SULPHIDES.

(*Continued from page 7.*)

"THE apparatus being all connected and gas tight, the water in the boiler may be raised to boiling heat, chlorine is abundantly given off, and after passing through the acid and chloride of calcium, soon begins to act upon the sulphur, which becomes very hot, and abundance of chloride of sulphur is formed, which will be seen in the bottle as a dark colored liquid with undissolved sulphur at the bottom. When the liquor has reached a strength of 136° Twaddle, a new bottle of sulphur may be put in the place of number one; when chlorine ceases to be evolved, the spent acid may be siphoned off, and a new charge of manganese and acid introduced."

Bisulphide of Carbon, or Sulphocarbonic Acid (CS_2), was discovered by Lampadius, at Freiburg, in 1796. It consists, in 100 parts, of 15.8 parts of carbon and 84.2 of sulphur, and can be produced on a small scale either by passing the vapor of sulphur over red-hot charcoal contained in porcelain or iron tubes, or by distilling an intimate mixture of a native metallic sulphuret and one-fourth its weight of well-dried charcoal or coke. For sulphur in particular, it has great affinity; at 15° C. (60° F.), 100 parts of bisulphide of carbon dissolve 37 parts of sulphur, while at 38° C. (100.4° F.) the same quantity dissolves no less than 94.5 parts. Sulphur and carbon do not combine when simply heated together in the solid state, because the sulphur volatilizes before the requisite temperature is attained; but if charcoal be heated to redness and sulphur vapor passed over it, the carbon burns in that vapor, forming the CS_2. The product is collected in a receiver cooled to about 32° C., and, in order to free it from the uncombined sulphur and of moisture, it is redistilled at a low temperature with chloride of calcium. Boiling point, 46.5° C. (118.5° F.).

When pure, it is a transparent, pungent, and very volatile liquid of strongly refractive power. Owing to its great volatility, it produces, under the exhausted receiver of the air pump, sufficient cold to freeze mercury. It is highly inflammable and, according to Balard, its vapor detonates with hypochlorous acid gas, forming carbonic acid, sulphuric acid, chloride of sulphur and chlorine; with solutions of hypochlorous acid, it yields carbonic, sulphuric and hydrochloric acids, together with free chlorine.

To Deiss and Jesse Fisher, of the Chemical Works, Ironbridge, Salop, is due the honor of having first prepared bisulphide of carbon for industrial purposes. The latter chiefly embrace at present the vulcanization of caoutchouc, the extraction of fat and oils from seeds, as well as from waste materials, etc., and the extraction of sulphur from its concomitant rocks, etc. It is an excellent solvent, not only for sulphur, for essential and fixed oils and fatty matters, but for resins, gutta percha, camphor, phosphorous, bromine and iodine.

Having said this much, we should, perhaps, now proceed to specify its applications as a solvent for chloride of sulphur in the vulcanization of india rubber, but as this necessarily forms part of the tabulated results before alluded to, and as its ordinary employment is pretty generally understood, we think it will best satisfy the needs of most of our readers if, as in the case of the chloride of sulphur, we at once lay before them a process of manufacture whereby the commercial bisulphide of carbon can be produced in the factory for *as little as two-and-a-half to three cents per pound*, or fully *one-fifth its present retail cost*.

Mr. Alexander Parkes says that shortly before he obtained his patent for the application of bisulphide of carbon as a solvent of india rubber and other gums, and also as a solvent of phosphorous in connection with some improvements in electro-metallurgy, all the sulphide of carbon he could procure in England or Germany for his experiments was only six or seven ounces, costing sixty shillings ($15.00) per pound, and even for this he had to wait nearly six months! On applying to an eminent manufacturing chemist in

London for help in the manufacture of bisulphide of carbon upon a large scale, he was politely informed that he must be mad to expect that a hundredweight could be made, as the danger of preparing it would be fatal to any one making the attempt.

The method already referred to, of passing sulphur vapors through a porcelain or iron tube, is a troublesome and dangerous one, while the frequently employed process introduced by Peroncel, and which we shall describe, is likewise open to many objections.

For it should be remembered that the vapors of bisulphide of carbon form a very powerful explosive when united with air or oxygen, and that no bisulphide can be produced while oxygen is present, as the sulphur has greater affinity for this than for carbon.

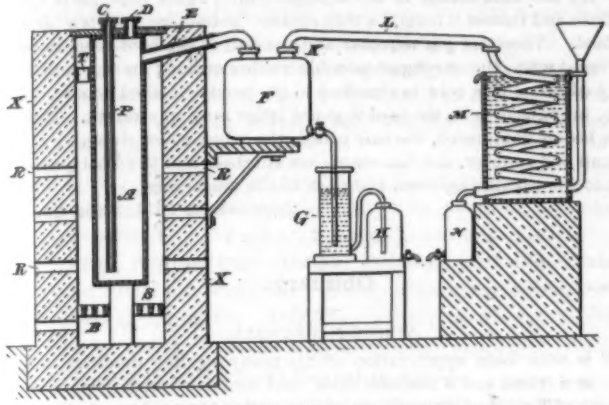

Fig. 1.—Peroncel's Apparatus.

Nor should any apparatus be employed which does not admit of the ready introduction and replenishing of both sulphur and carbon, as well as of easy access to all parts without subjecting the attendants to the injurious inhalation of the sulphurous acid vapors arising during the operation.

Briefly described, Peroncel's apparatus (Fig. 1) consists of a high lined metallic cylinder, or fire-clay gas retort, *A*, surrounded by brickwork, *X*, and resting upon a fire-grate, *B*. It has two openings, *C* and *D*, at the top, as well as an arm, *E*, near its upper surface, leading into an earthenware vessel, *F*, intended to receive the vapors of sulphide of carbon. In this vessel, *F*, only part of the sulphide is condensed, the rest passing into the Florentine receiver, *G*, containing water, and thence into a storage vessel, *H*. Such of the vapors as are not condensed in *F* pass out at *K*, through *L* into the worm, *M*, kept cool by means of a current of water, and thence through the vessel, *N*. Into the opening, *C*, an earthenware tube, *P*, is fitted to receive the sulphur, after the coke (or preferably the charcoal, which gives a better yield) has been dropped into the other opening, *D*, and becomes red-hot. Fuel is introduced through the side openings, *R R*, air entering at *S S*, and the products of combustion passing off at *T*.

The main objections to Peroncel's apparatus are the difficulties attending the necessary replacing of the cylinder as well as the removal of the crystallized sulphur from, both the vessel, *F*, and the worm, *M*, also the serious inconvenience likely to be caused by the sulphurous acid vapors passing out at *C* during the frequent removal of the covering for the introduction of the sulphur.

These difficulties are obviated in the apparatus of Mr. Ignatius Singer, which can be safely recommended, and which we will now describe.

In Figure 2 is shown a strong and well-lined metal cylinder or fire-clay retort, *A*, surrounded by brickwork, *X*, at a distance of about one-half to three-quarters of an inch from the sides of the cylinder, and resting upon a support of brick, below which are the fire-grates, *B*. From the upper surface of the cylinder projects a long arm, *E*, and close by the latter are two openings, *C* and *D*, the last-named being for the introduction of the charcoal after the cylinder has been heated to a red color. The cylinder has likewise another, though shorter inclined arm, *E'*, extending from its lower surface, through which the sulphur is easily introduced. The vapors of sulphide of carbon pass by the long arm, *E*, into the vessel, F, and through the Liebig condenser, *L*, into the receiver, *G*, containing water, and thence through the siphon, *G'*, into the storage vessel, *H*.

This disposition overcomes the difficulties previously alluded to in connection with the removal of the crystallized sulphur and with the replacing of the cylinder, which latter need not be taken up so frequently. Besides, in order to economize time and fuel, a smaller cylinder, kept full of charcoal, can be placed above the larger one, *A*, where it receives the heat on its way to the chimney.

Nearly all of the free sulphur condenses while passing through the arm, *E*, and runs back along the incline into the bottom of the cylinder by way of the pipe, *Z*. The portion which is not condensed into the vessel, *F*, can be easily removed (when distillation is not going on), as the two openings of the vessel are connected by telescopic tubes, made air tight by water.

No material inconvenience can arise through the development of the injurious vapors. They pass by way of the arm, *E'*, into a flue, and through the chimney, as well as directly into the open air, through the vent pipe, *C'*, which is opened by a lever before introducing charcoal at *D*.

The above has the additional advantage over the Peroncel appar-

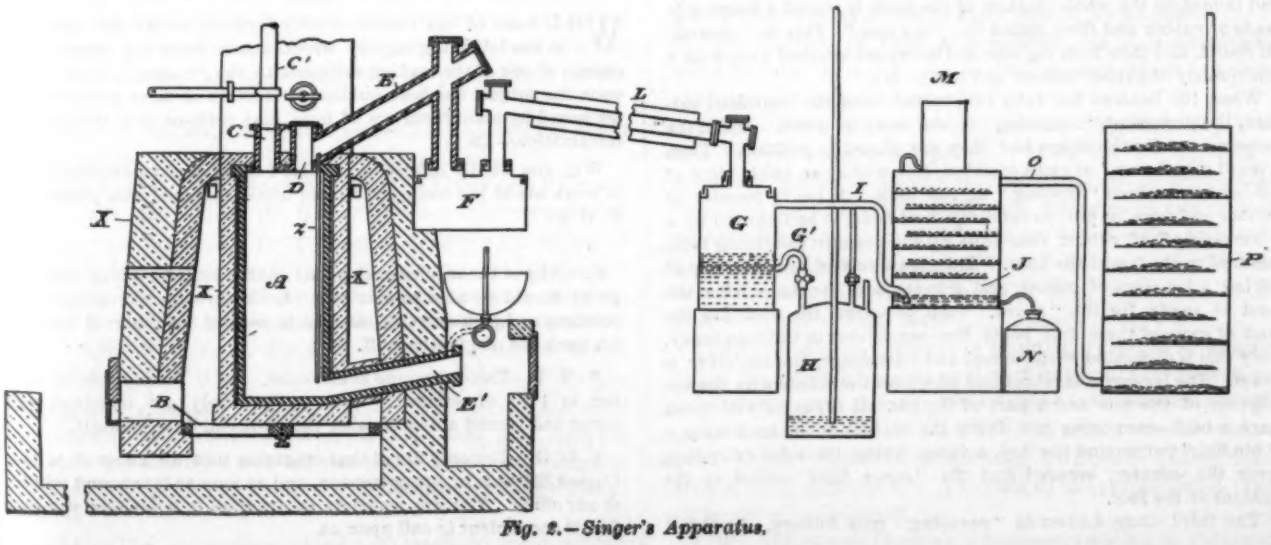

Fig. 2.—Singer's Apparatus.

atus in that it provides for the escape of sulphureted hydrogen and other uncondensable vapors. As these interfere with the formation of bisulphide of carbon, they are led by the tube, *I*, through a layer of vegetable oil, *J*, which slowly runs from a reservoir, *M*, and finally lands into *N*. The vapors, after having thus been "washed," circulate in zigzag through a number of trays covered with the oil, and pass by *O* into *P*, wherein the trays are covered by lime or oxide of iron.

Building a Rubber Boot.

IT is forty years since the first rubber boot was made, and a very clumsy specimen of foot-wear it was. Prior to this, the old-fashioned rubber shoe was in existence, but not much worn and it was called a golosh.

The styles of boots now made are nearly identical in all of the leading rubber companies, each however having some strengthening device of more or less excellence upon which they pride themselves. All boots are made by hand upon wooden "trees," which are prepared of carefully seasoned maple. The seasoning is a most necessary feature of these wooden forms, else they would shrink in the heat of vulcanization and soon become worthless. Iron trees have been used, and while they have some advantages they are practically "barred out" by their great weight.

A well arranged boot-room has first a wide center circle running its whole length, through which run car tracks for the easy removal of the finished boots to the "heaters." Running from this main passage-way, are the "alleys" of the workmen, in front of each of whom is a long table, fitted with a rack capable of holding fifteen pairs of boots. A portion of this table is padded and reserved for the work of making-up, the tools for this being simply a small hand roller, a stitcher, a knife, and a cement cup and brush.

As the various pieces that are to be joined together to make the perfect boot are brought in "books" to the boot-maker, they are first laid over the table and cemented with a paste made of rubber and benzine. The first step then is the lasting. A tree is put upon the "block" with the foot upward, and the leg-lining, of felt usually, is wrapped round it, and connected at the heel by a bit of "piping." The edges are then lapped one upon the inner sole where they stick fast. The lining is then seamed up the back by drawing the piping edge over upon the rubber coating. Next the lining is fastened at the top of the tree to make it firm and also to take out any looseness that may be in it.

Then the foot-lining is connected at the instep and lapped over on the inner sole. A rag filler is the next necessity, to fill the space left on the sole between the lower edges of the leg lining. Over this, and indeed on the whole bottom of the boot, is placed a tough sole made of rubber and fibre, called the "rag sole." This is "skived" all round, and then both rag sole and lining are brushed over with a fine quality of rubber cement and left to dry.

When the benzine has fully evaporated from the cemented surface, the process of "trimming" is the next in order. First, the holes are cut for the straps and they are placed in position. Then a small "heel-stay" of cloth is added, followed by an ankle-piece of rubber cut without "lapping" at the back. A heavy counter of rubber and fibre is put around the heel next, to be followed by a "back-strip" of rubber that runs up the seam in the lining from the heel to the top of the boot. This is succeeded by a toe-strip of piping, a toe-piece of rubber, and side-stays of the same, when the boot is ready for the "cover." All this time the boot has the look of some of these felt boots that car-drivers in Chicago fancy, only this is decorated with cement and trimmings, and the other is plain. The leg-cover is rubber and goes over the whole with the exception of the sole and a part of the toe. It is put on with great care, a back-seam being run down the middle of the back-strip, a "binding" put around the top, a vamp lining the sides extending over the counter, secured, and the "outer filler" added to the bottom of the foot.

The third stage, known as "covering," now follows. In this a counter of heavy rubber is put around the heel, the point being in line with the back seam, the edges being carefully "rolled down." Then a vamp of heavy rubber, the "tongue" exactly covering that of the vamp-lining. The sides of this extend round to the counter, and are distinguished by two side seams. These seams are then run over with a "double stitcher" which is similar to a pair of sharp tracing wheels, and which not only help fasten the rubber to the cemented surface beneath, but also make a very neat finish. After this the vamp is cut out around the outfiller, and the bottom of the boot receives a coat of cement which is to hold the sole on.

When the boot is dry it is ready for the fourth stage, which is "soling." To digress a little, a sole is in four pieces, and is made up for the boot-maker in the soling-room. These four parts are a fibre and rubber "form," a thin rubber "sole-piece," a "top" and a heel. These are put together and are sent to the boot-room to be covered with the strongest possible rubber cement on the bottom and edges. The sole is attached to the partly-finished boot at the toe, brought over to the heel that the latter may sit straight. Then the heel is hammered, the sole rolled, the edges rolled down in the vamp and counter, the last seams are stitched, and the boot passes on to the varnishing-room and then to the vulcanizer.

BOOTMAKER, B. R. SHOE CO.

Obituary.

TIMOTHY CORNWELL.

IT is with keen appreciation of his many sterling qualities, both as a friend and a business man, that we record with sorrow the death of Timothy Cornwell, which occured at his residence in Brooklyn, N.Y., last month. Mr. Cornwell, was for thirty years the Secretary of the New York Belting & Packing Company, and the confidential adviser and right-hand man of John H. Cheever, Esq., the treasurer and business manager of that well-known firm. In this connection he proved competent, reliable and well worthy of the great confidence he enjoyed. Generous to a fault, his purse was always open to the needs of his friends, and his advice, eagerly sought, was freely given. His demise is a great loss to the company, and to the business community one of its highest ornaments. Mr. Cornwell had just passed his sixty-second year and bade fair to complete the allotted three score years and ten. He leaves a large family, to whom he was devotedly attached, and who in turn loved him dearly, as did all who knew him.

Answers to Correspondents.

WILL some of our readers kindly forward, to our care, answers to the following inquiry which comes from the master mechanic of one of the leading railroads in the country. If no book upon the subject has been published, circulars or other printed matter issued by manufacturers of hose, may perhaps give the desired information—ED.

Will you kindly inform me where I can find any published book or work about the testing of rubber hose—chemical and physical—P. H. C.

C.—Any of the mechanical goods manufacturers whom you can go to should be able to suit you. Look through our advertising columns and pick out the one who is nearest neighbor; if he fails hit upon the one furthest off.

A. N. T.—The compound is no secret. It is merely 1 lb. of rubber to ½ lb. of sulphur. You can probably get it mixed and cured and turned a deal cheaper than you can do it yourself.

F. D. G.—The only file of that magazine that we know of in the United States is in our possession, and as soon as it is bound will be at our office. You are welcome to examine it whenever you can find it convenient to call upon us.

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ANNALS

—OF—

India Rubber, Gutta Percha, Celluloid and Asbestos.

India Rubber Caoutchouc or Gum Elastic [called *cachuchu, cahuchu*, by the South American Indians; German, *kautschuk, federharz;* French, *caoutchouc, gomme élastique*] the concrete milky juice of numerous trees and plants growing throughout the tropical regions.

Gutta Percha [called in all languages by that name which is of Malayan origin; *gutta* signifying gum, and *percha* the tree from which it is obtained] the concrete milky juice of trees belonging to the family of Sapotaceæ, found in the Malayan forests and islands of the Eastern Archipelago.

Celluloid, a product of recent invention, obtained by dissolving *pyroxylin* or *gun cotton* in camphor or other solvents with the aid of heat and hydraulic pressure.

Asbestos, Amianthus [Greek, *asbestos,* inextinguishable, and *amiantos,* undefiled; Latin, *amianthus asbestinum;* French, *amianthe;* German, *asbert*] a fibrous mineral found mainly in veins in the serpentine and other primary formations throughout the entire world.

(*Continued from page 3.*)

1691.—Ciampini (Giovanni Giustino), of Rome, describes the following method of preparing fine asbestos (incombustible) cloth:

"Having previously steeped the amianthus in warm water, divide its fibres by gently rubbing them with the fingers, so as to loosen and separate all extraneous matter; then pour on repeatedly very hot water as long as it continues to be in the least discolored. . . . After being dried in the sun, card the threads with fine cards, and the long filaments thus obtained are to be steeped in oil . . . . mix with them a small quantity of cotton or wool, and by means of a thin spindle, the whole is to be drawn out into thread, taking care that in every part the amianthus may be the principal material. The cloth being then woven in the usual manner is to be placed in a clear charcoal fire to burn off the cotton and the oil, when the whole remaining tissue will be pure white amianthus."

1702.—A shroud of asbestos (amianthus) containing burnt bones and ashes is found in the Vatican at Rome.

1736-1744.—La Condamine (Charles Marie de), a French savant who was sent by the King of France, in company with Bouguer and Godin, for the purpose of measuring a degree of the meridian, brings, on his return journey to Europe, the first specimens of caoutchouc from Peru by way of the Amazon. He reports having also found this "most singular resin" to the north of Quito, in Ecuador, from a tree named *hhévé*, or *hyévé*, and where it was called *pao de xyringa* by the Portuguese colonists. The results of his observations were published in the *Transactions de L'Académie des Sciences*, wherein he describes the various methods of collecting the juice and of treating it for the production of many useful articles.

1751.—The *cachuchu, cahuchu*, caoutchouc (pronounced koo-chook) tree is discovered in the colony of Cayenne, French Guiana, by Fresnau, and, through his friend, Mr. De la Condamine, it is described in the "Mémoires de L'Académie Royale" during the same year.

1761-1763.—Hérissant and Macquer publish in the "Mémoires de L'Académie" the result of their chemical investigations of India rubber solutions. Five years later, Macquer reports fully on the means of dissolving the "resin caoutchouc" in ether (*sans le dénaturer*), and of repeatedly coating caoutchouc forms so that the latter will retain a covering of the gum after the evaporation of the ether. (*Ann. de Chimie*, XI., 147.)

1768.—Grossart (Chirly) alludes to the method of dissolving caoutchouc in ether as well as in volatile oils, and, in the memoir read before the Académie de Dijon, August 28, 1791, describes his process of constructing tubes of caoutchouc by rolling strips around glass cones and cylinders.

1770.—Priestley (Dr. Joseph), an English natural philosopher and theologian, in the preface to his work, "A Familiar Introduction to the Theory and Practice of Perspective," thus calls attention to caoutchouc: "Since this work was printed off, I have seen a substance excellently adapted to the purpose of wiping from paper the marks of a black lead-pencil. It must, therefore, be of singular use to those who do practice much drawing. It is for sale by Mr. Nairne, Mathematical Instrument Maker, opposite the Royal Exchange. He sells a cubical piece of about half an inch for three shillings, and he says it will last several years."

1781.—Berniard, among his many discoveries, finds that "a solution of caoutchouc in oil of aspic, mixed with alcohol, throws down white flocks insoluble in hot water, which remain, at the surface of this last fluid, and become white and solid like wax by cooling."

1790.—Fourcroy (Antoine François de), an eminent French chemist, member of the National Institute, publishes, in his remarkable "System of Chemical Knowledge," the result of his numerous experiments on the milk of the caoutchouc tree. He observes that: "Among vegetable matters, the oils are the only substances which have an evident action upon caoutchouc. Fixed oils dissolve it as they do melted wax, but it remains adhesive and viscid in the solutions. . . . By the mixture of fixed and volatile oils it is dissolved in order to form that fat and flexible varnish which can so advantageously be laid upon silk."

1791.—Peal (Samuel) takes out in England, May 2, the first known caoutchouc patent. It is for a "method of rendering perfectly water-proof all kinds of leather, cotton, linen and woollen cloths, etc." His coating consists of india rubber dissolved "by distillation or by infusion in a small quantity of turpentine spirits over a brisk fire, or by infusion in other spirits and in most kinds of oils; or of india rubber used in its native fluid state."

1797.—Johnson (Henry) is granted, July 26, an English patent for rendering stuffs or cloth "impenetrable to wet, and more elastic and durable when made into garments." His method was to cover the stuff or cloth with a varnish made of india rubber "dissolved in spirits of turpentine and spirits of wine in equal quantities." The odor of the turpentine is taken off by oil of wormwood.

1798.—Howison (James), a surgeon, residing in Prince of

Wales' Island, publishes a memoir in "Asiatic Researches," wherein he relates the discovery of the *urceola elastica*, which was afterward met with along the coasts of Sumatra and in other parts of Malaysia.

1800.—Importation of the first bottle rubber from Brazil into the United States.

1803.—A large factory is erected at Saint Denis, near Paris, for the manufacture of rubber elastic bands or braces.

1805.—Specimens of the East India rubber plant, *ficus repens*, are first introduced in Great Britain.

1813.—Clark (John) obtains, July 14, an English patent for the manufacture of inflated beds, cushions, pillows "and other articles of the like kind," of which the inner casing is made impervious to air by coating it with the following solution: To one ounce of caoutchouc, add eight ounces of turpentine spirits; let it stand two or three days in a closed glass receptacle, then throw the whole in an open vessel wherein it is to be boiled for several hours with about seventy ounces of linseed oil.

1813.—Hummel (Jacob F.), of Philadelphia, obtains, April 29, a United States patent for a gum elastic varnish.

1819.—Hancock (Thomas), of Stoke Newington, commences his experiments with caoutchouc. His first attempts to dissolve it with oil of turpentine are unsuccessful. In the year following, he succeeds in satisfactorily attaching to different articles the pieces cut off from the bottle-shaped masses, by sewing caoutchouc rings on the wristbands of gloves, or upon the tops of stockings, and attaching them likewise to belts, braces, boots, shoes, etc. He also invents a *masticator*, consisting of a spiked roller working inside of a spiked hollow cylinder, wherein are placed the lumps of caoutchouc to be combined into a plastic mass. The process was not patented, yet Mr. Hancock managed to keep secret to himself and to his many employees the workings of this "pickle" machine during the long period of twelve or thirteen years.

1820.—Hancock (Thomas) obtains his first English patent, April 29. This is for "an improvement in the application of a certain material to various articles of dress and other articles, that the same may be rendered more elastic." He attaches the pieces of caoutchouc in the manner already described under the 1819 date, not insisting "upon any particular mode of fastening . . . . for that may be varied as convenience may require." The full specification of this patent, as well as of all the other Hancock patents, will duly appear.

1820.—Nalder (Francis), of London, is, on the 21st of September, granted in France a ten years' patent for process of manufacturing with caoutchouc, elastic threads for suspenders, gloves, belts, garters, wigs, corsets, boots, shoes and other articles of wearing apparel. Nowhere else does Nalder appear to have been granted protection until the year 1846.

1820.—Parton says (*North American Review*, July, 1885) that the first pair of rubber shoes imported from Para reached the United States during the present year. They were covered with gilding, resembling in shape the shoes of a Chinaman, and naturally attracted much attention.

1820.—Howe (John J.) obtains a United States patent for a Mill, constructed with a rolling and slipping motion, which has continued to form the usual mode of preparing india rubber for use upon cloth or otherwise.

1821.—Syme (James), a celebrated Scotch surgeon and physician, is represented as the first to discover an efficient means of waterproofing by means of caoutchouc, but his process does not appear to have been brought tangibly before the public.

1821.—The Hancock *masticator*, which was originally worked by a winch, requiring the power of a man to manage it, and wherein, at first, hardly more than two ounces of caoutchouc could be treated at one time, now gives way to an iron machine worked by horse-power capable of treating fifteen pounds of caoutchouc at the outset. This was 'ere long to be replaced by *masticators* capable of being charged with 180 to 200 pounds, and the resulting blocks of which, without joining, were six feet long, twelve or thirteen inches wide and about seven inches thick.

1823.—Five hundred pair of rubber shoes are imported from Brazil into Boston, and, although thick, heavy and ill-shaped, find a ready sale.

1823.—Macintosh (Charles), of Glasgow, Scotland, obtains in England, June 17, his first patent for the manufacture of the justly celebrated water-proof double textures. The circumstances which led to this invention are furnished by Mr. George Macintosh in a memoir printed for private circulation. He says: "Mr. Charles Macintosh, chiefly with the view to the production of ammonia to be employed in the manufacture of Cudbear, entered, in 1819, into a contract with the proprietors of the Glasgow gas works, to receive for a term of years the tar and ammoniacal water produced at their works. After the separation of the ammonia in the conversion of the tar into pitch, to suit the purposes of consumers, the essential oil termed naphtha is produced; and the thought occurred to him of its being possible to render this also useful, from its powers as a solvent of caoutchouc or india rubber. By exposure to the action of the volatile oil termed naphtha, obtained from the coal tar, he converted this substance into a water-proof varnish, the thickness and consistency of which he could vary according to the quantity of naphtha which he employed in the process."

He dissolved shreds or parings of caoutchouc in the coal oil by trituration with heat in a close iron vessel, producing a thick varnish, "resembling transparent honey," with which he coated two layers of cloth, silk or other material, which were afterwards pressed together so as to preclude the passage of air or water. These were at first called "Water-proof Double Textures," but soon came to be universally designated by the name of "Macintoshes."

(*To be continued.*)

—Miss Bacon (they have been discussing orchids).—"And now, Professor, I want you to tell me all about the plant from which electricity is made." Professor Hohonthy (aghast).—"The which?" Miss Bacon—"You certainly must have heard of it. Father says its high cost prevents the general use of electric lighting—I mean the electric plant."—*Harper's Bazar.*

—The Ficus Elastica, from the milk of which the india rubber of commerce is made, grows well in Southern California, and preparations are making to cultivate the trees. A great many will be planted next winter.

The Past and Present of Old Rubber.

Editor of THE INDIA RUBBER WORLD:

The first attempts at the use of old rubber are said to have been made a great many years ago, and two parties claim priority in the matter; Mr. Hayward, of the Hayward Rubber Company, of Melrose, Mass., and Mr. Hall of the Beverly Rubber Works. But, however successful these were, the failure of both factories prevented any extended commercial applications being made. The uses then made of it antedate my recollection of the business, as I only go back to the commencement of the war.

From the year 1865 to 1870 the only people using old rubber to my knowledge were a prominent New York firm and an equally prominent firm in this city. The former at first adopted the method of taking old shoes and sending them out to the women in the country and having them torn apart by hand, paying so much per pound for all clean rubber that could be stripped from the cloth in the shoes. Mr. Austin Day, of Ansonia, about this time commenced to grind rubber, at first grinding car springs and afterwards old shoes, and he sold a considerable amount to one firm here. I used to sell the old shoes to a party in Boston who shipped them to points in Connecticut. About the year 1870, the Boston Drug Mills established a little factory on the Back Bay, run by tide water, where in connection with their business of grinding foundry facings, they ground more or less old car springs for the use of one of the car spring companies. Soon afterwards I started a little factory on the Back Bay (where Westchester Park crosses the B. & A. R. R.) and there engaged in a secret process of old rubber manufacturing. This did not prove successful in a pecuniary sense, but as I had been forced to grind the rubber to a powder for use in this process, I was led to furnish two Boston manufacturers with old rubber, ground with car springs or shoes, to suit their purposes.

Some time after this, in the year 1871, I was led to investigate the feasibility of removing the cloth from ground shoes so as to make a rubber free from fibre, as but limited quantities of the old shoes ground as these were, cloth and fibre together, could be sold, since it could only be used in the cheapest grades of packing. But there was a demand for rubber free of fibre which promised a large amount of trade, and in fact all kinds of rubber goods which were free of fibre, like car springs, wringer rolls and tubing, in fact any kind of rubber free of fibre, met with ready sale when ground in the powdered form. Finally, I hit upon the method of subjecting the ground material to an air blast, and discovered that the rubber would fall very close to the end of the apparatus while the cloth would be borne by the blast of air to a considerable distance away, and the two were thus separated with very little trouble and cost. For several years I used this as a secret process, until finally one of my competitors paid some hundred or two dollars to my night watchman to let him into my factory, and gradually the discovery became public property until now it is in use in every factory where they grind old rubber.

In the year 1879 an employee of the New York Belting and Packing Company claimed to have discovered a new process of removing fibre from rubber by means of an acid bath. This was simply an old process that had been used for years on both sides of the Atlantic, but an application was made for a patent on it. Simultaneously Mr. Mitchell, of Philadelphia, and the National Rubber Company claimed to have discovered a like process, and all three applied for patents from the United States Government, and for several years the matter was in litigation. Finally patents were granted to all three, and they are all using this process, which is claimed to have certain advantages. By it the old rubber is coarsely ground and then placed in tanks and submitted to the action of dilute acid, assisted by heat which oxydizes the fibre and renders it easy to get rid of by means of washing it afterwards. The rubber thus cleaned is subjected to the devulcanizing process, then sheeted, in which form it is used in various factories.

The old-rubber industry has become a large one, and at the present time probably from ten to twelve thousand tons of old rubber boots and shoes are collected and used yearly. The main seat of the industry is in the three States of Massachusetts, Connecticut and New Jersey, only a small portion of the old rubber being used in any other State. The old shoes are collected in every hamlet and taken all over the country by people who make that a business; then it is sold to larger collectors in the principal cities, who in turn forward it to market.

There are many grades of goods which could not be profitably manufactured to-day were it not for the discovery of the use of old rubber. Much of the heavy rubber clothing of to-day is composed in large part of old rubber compound; and practically a rubber coat is simply a cotton coat with one or both sides waterproofed with this rubber compound; and the price has been very materially lessened by the discovery of the methods of using old rubber. Contrary to general opinion, old rubber is not used as an adulterant but goes into goods of higher cost and grade than those where it is not otherwise used. It has cheapened many classes of goods and makes it possible to produce them at a price which would have been thought ridiculous before the discovery of these various uses. And in fact it would be almost impossible to furnish the amount of rubber goods which are turned out in the United States yearly, were it not for the use of old rubber. The supply of new rubber is slowly increasing, but it would not begin to meet the demand were it not for the varied uses to which old rubber has been applied, thus preventing too great a call upon the source of supply.

EUGENE H. CLAPP.

BOSTON, November, 1889.

We learn that a new edition of the well-known Electrical Trades' Directory and Hand Book is to be issued early in January by *The Electrician*, No. 1 Salisbury Court, Fleet street, London, E. C. The valuable contents of the previous seven editions are certainly such as to recommend it to all interested in the pursuit of electrical information generally.

New Goods in the Market.

TO MANUFACTURERS:

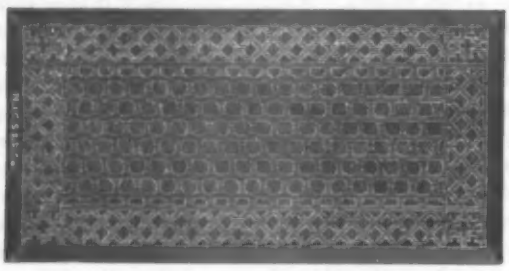
It shall be our aim to embody in this department descriptions and illustrations of all the latest novelties introduced in the market; to the end that jobbers, retailers and rubber goods buyers generally may look here for information as to every thing new that each month or season brings forth. Manufacturers are, therefore, most cordially invited to co-operate with us in making the department as complete and attractive as possible—the distinct understanding being that no charge whatsoever, either direct or indirect, will be made for these publications. Our reward will come through giving our readers valuable information; and that will be reward enough if manufacturers but co-operate with us in giving the information freely and in all cases at the earliest practicable moment.

In forwarding descriptions of new goods, be careful to write on one side of the paper only; be as brief as possible, but always write enough to give the buyer a clear idea of the article you offer; quote prices if practicable; give your full address, plainly written; and in all cases send a small illustration or wood cut if you have one.

A BEAUTIFUL piece of work is the moulded water bottle, made by the India Rubber Comb Company. Mr. Schlessinger showed us the first one that he made, some time ago, before the design was fairly finished, and we pronounced it a success; but its present perfection surprises us, and is a flat contradiction to those who claim that rubber goods cannot combine utility and beauty. In the hard rubber head is also a novelty that has been made the subject of a patent by the company.

—A most useful invention is the new Bottle Stopper of the Globe Novelty Co., 1425 Filbert street, Philadelphia, Pa. It consists of an acorn-shaped piece of hard rubber, in which runs a screw of non-corrosive metal. At the upper end of the screw is a little swivel, and at the lower end, a band of pure soft rubber. Turning the swivel downward, swells the rubber and closes the bottle tight, while the reverse motion loosens and allows the stopper to be easily withdrawn.

—Through the courtesy of the New Jersey Car Spring and Rubber M'f'g Co., of Jersey City, N. J., we here present a cut of a new and



artistic mat designed by them. They make it in 31 regular sizes, and also have the same pattern for "stair treads."

—The new water-proof cloths, manufactured by the Goodyear Gossamer Co., Hudson, Mass., and branded "India Stripes" are selling freely in the trade. Their distinctive merit consists in the fact that they can be produced in great variety of stripes with many colors, and they retain their colors excellently well under all kinds of exposure.

—Of the neatest and most practical "new things" of to-day, is the Rubber and Cushioned Tire, made by the Rubber and Cushioned Tire Co., 631 Susquehanna avenue, Philadelphia, Pa. It is an appliance whereby the jolting of a carriage or cab is entirely done away with, and is already much in demand by numbers who appreciate every advance toward comfort in riding.

—The Mineralized Rubber Co. of New York, have purchased the U. S. patent for fluted Rubber Belting, belonging to Monsieur Poulan-Beurier of Paris, and are now preparing to put this belting, which is having such a phenominal sale in England and on the Continent of Europe, on this market.

—The handsome rubber mats that go under the name of the "Pullman Car Treads," are a taking novelty. The surface of the rubber is so moulded as to catch and reflect the light in such a manner that it gives the effect of several dark, rich shades, that blending together, give a beautiful softness to the color of the whole. This mat is manufactured by the Home Rubber Company, of Trenton, N. J. Another novelty of this same firm is a line of mats shaped to exactly fit the floor-space of carriages or coupes, and finished with a fidelity to detail and in such good taste that they are fit furnishing for the most elegant vehicle.

—A brush that cannot by any possibility shed its bristles is that made by the Rubber and Celluloid Harness Trimming Co., of Newark, N. J. We illustrate a lather brush, sectionally and complete. The process of vulcanizing the soft rubber that holds the bristles in place, and later, the hard rubber band that encloses and protects

from acids, oils and solvents of all kinds, we shall make the subject of a future article. The company make a special brush for varnishing, in a variety of styles; and it is of great use in rubber work, both as a cement brush and a varnishing brush for shoes, etc.

—Among the specialties of the Standard Rubber Co. are a novel line of macintosh over-gaiters, that are taking with the trade immensely. Other macintosh goods that this company make are ladies', gentlemen's and infants' garments, in all sizes and of the finest imported materials. A novelty for which they are at present having a great call is a three-cape Newmarket, and it certainly is an exceedingly stylish garment.

—In the past there has been a deal of "kicking" about the wear of rubber belts. One constant complaint was, that they burst open on the center seam after a brief wear. This complaint is done away with by the introduction of the "No-Seam" belt, of the Boston Woven Hose Co., which was made the subject of a full-page advertisement in our last number, and mentioned here not for that cause, but because it is new.

—Dr. W. S. Black's Aspirating Syringe is the name of a new instrument that is manufactured by the Sonnebonne Rubber Comb and Novelty Co. It is of the best hard and soft rubber, and combines in one article a cupping apparatus, a breast-pump and an aspirator.

—A steam hose, especially adapted to withstand a high degree of heat, is what the Peerless Rubber Co. are introducing. It is of red stock, extra heavy, and bears the name "Peerless Steam Hose."

—Commercial rosin, although always used by rubber men, has never given complete satisfaction. In the new "friction resin" of the Adamanta M'f'g Co. of Boston, the disadvantages of common resin completely disappear, and excellences appear instead. By a special process of manufacture, the acid of the gum, and its proportion is large, is completely removed, as is also the volatile oil, and the pure resin with its natural stickiness is left. The process appears to alter the melting point of the gum considerably, carrying it up nearly to two hundred degrees, while even at a low temperature it remains flexible. As a "sticker," which will not blister nor injure the finest goods, this new gum appears to be the best of its price that the rubber trade have yet been offered.

—The Hoyt Rubber Co., 4 Beverly street, Boston, are manufacturing a washboard that they have named the "Electric Rubber." It has instead of the usual zinc face, a series of corrugations, made up of alternate strips of seasoned maple and rubber. The board is

well spoken of by users, and has been adopted by many of the hotels and large institutions in the vicinity of Boston.

—*Patent Metallic-edged Rubber Belting.* This belt does not become abraised, and the plies do not separate as is often the case where the edge is unprotected. The same company, the Chelsea (Mass.) Bone Fabric Rubber Co., are also putting upon the market a superior line of belting and hose made of duck, through which are woven fine threads of wire, greatly increasing its strength.

—Little by little it has been leaking out that the Colchester Rubber Co., Colchester, Conn., had a surprise in store for the holidays. At last it is fairly out, and the gossip of the day is the new "Holiday Shoe," that is certainly a thing of beauty, and is put up in a manner that is as unique as it is tasteful. The shoe to begin with, is an unlined ladies' shoe of the softest finish of rubber, without a trace of stockinet lining in it, and is so tough with all its lightness and apparent delicacy, that it can be stretched and pulled almost indefinitely without tearing. It is put up in a dainty bag of silk or plush, and will be a sensible and elegant present for wife, sister, or sweetheart. The trade appreciated the selling qualities of the new shoe at once, and orders were given, hundred case orders at that, by numbers of firms; and now the busy Colchester factory is "rushing" to get the goods out.

—A new material that isn't rubber, nor is it gutta-percha, but that partakes of some of the peculiarities of each, is called Coraline. It is a curious round fibre, that hetcheled and tempered by heat, is made into dress stays by the well-known house of Warner Bros. The process of manufacture is superintended by Thos. P. Taylor, the patentee of the goods at the "Doctor's" factory in Bridgeport, Conn.

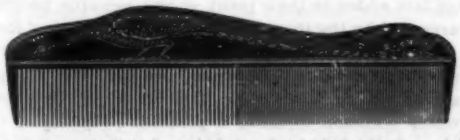
—A neat and necessary adjunct to any rubber packing room, is the Paper Rack and Cutter just put into the shipping room of the Mattson Rubber Co. It is so arranged as to hold the wrapping paper in rolls of varying widths, and while a sheet of any length may be pulled off, the knife resting against the roll is always ready to "sever the connection."

—The manufacturers of type-writers have set the seal of their approval upon the mats, which we here illustrate, by ordering them

by the hundred. The mat deadens the noise, gives an easier "touch" to the keys, and saves wear and tear of the machine. They are manufactured by the United Rubber Co., Trenton, N. J.

—The Hard Rubber Automatic Inkstand of the Acme Rubber Works, N. Y., designed for offices, schools and libraries, is said to be of entirely original construction, requiring no manipulation whatsoever, and not admitting of the possible evaporation or thickening of the ink.

—The "Peacock Comb" is a new product of the hard rubber department of the B. F. Goodrich Company, of Akron, Ohio. The design is certainly very beautiful, and consists of a peacock, his long plumes folded so that they cover the back of the comb, stretch-

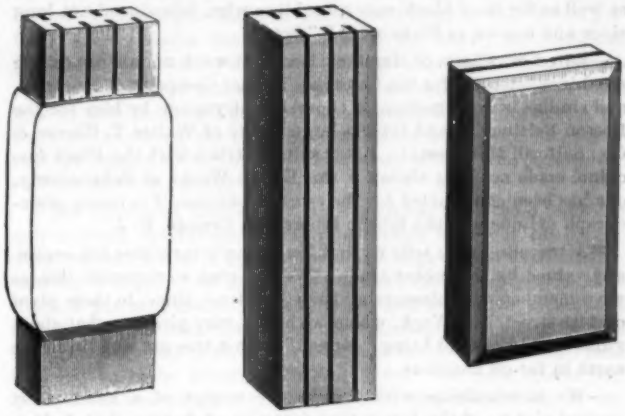


ing to one end, while his proud head is bent low at the other. The moulding of the figure is a very pretty piece of work, and the lady who does not choose this before the ordinary plain comb, has no eye for artistic designs.

—The two new grades of recovered rubber, the "L. & M." and the XXX., which are before us in sample form, are meeting with gratifying success among rubber manufacturers. One enthusiastic buyer says in a letter of commendation: "the man who does not prefer these goods to the regular 'shoddy' is a fool," which is blunt, but none the less to the point. Loewenthal & Morganstern are the manufacturers.

—The Erie Rubber Company, Erie, Pa., are winning high encomiums for their Sutton ring packing. A leading expert has recently declared it to be "the best packing made for high-speed engines;" and, within a short time, it will be the subject of a special article in one of the scientific journals of the East.

—The B. F. Goodrich Co., Akron, O., have just issued a handsome colored hanger, illustrating their new line of erasive rubbers.



We give here outline cuts of three samples taken from it:

The "Sterling" is made both plain and fluted, and the two others both bar and block crown. They make a very handsome line of goods, and will unquestionably sell readily.

—The Boston Belting Co. take extra space in our advertising pages this issue to illustrate their wire covered hose and their various methods of lacing and fastening rubber belts. Several of the latter are original and new, and the series has been copyrighted. They will well repay careful examination, and are well worth preserving. See folio V.

From the "Lake Shore."

THERE is a certain class of buyers in this country, and their number is daily increasing, who want just the best goods that can be made of rubber, and they are willing to pay a fair price for them; but, as they say West, they want the goods "right." Mr. Whitehead, of the Lake Shore Rubber Co. of Erie, has been meeting the wants of this class of purchasers, to a highly gratifying degree, in a hose that he brands as the "U. S." It is customary to see a smile of incredulity wreathe the face of a rubber man when one says that the only rubber used in an article is Para, and yet Mr. Whitehead is using that and that alone in this grade of hose. An extra heavy duck, woven expressly for these goods, helps greatly in the wear and tear to which any hose is subjected. And so popular have these goods become wherever introduced that, in almost every instance, either a duplicate order has followed the original, or else the goods themselves have made new customers. Increased orders and new customers have been the rule with the Lake Shore of late, however, for at no time during the past half-year have they been able to keep ahead of their orders. A large twenty-five foot belt press was added to the plant during the past summer; three new grinders followed immediately thereafter, and now they have just added a new 250 horse-power Stearn's automatic engine. Their daily capacity has therefore been increased to very handsome proportions, and the gratifying feature of the increase is that it is necessary to run it full capacity under full time.

Trade Notes.

IN the new plant of the Brook, Oliphant Co., in Trenton, the engine and boiler were designed especially for the heavy work of manufacturing mechanical rubber goods by Mr. Peter Wilkes of the same city. Mr. Wilkes makes a specialty of machines for this class of trade, and is well known through his belt cutter, ring cutters, presses, and his success in making moulds which are right from the start, and are not subject to endless alterations.

—The Benedict & Burnham Manufacturing Co., of Waterbury, Conn., have, for the time being, abandoned the idea of making a rubber insulated wire. They continue to receive large orders for their hard drawn copper wire for telephone and telegraph purposes, as well as for their black waterproof line wire, introduced not long since and known as Diamond "B" brand.

—Edred W. Clark, of Hartford, is now at work upon large tubing machines intended for the Canadian Rubber Company of Montreal, and similar in construction to those recently made by him for the Boston Belting Co. and for the large works of Walter T. Glover & Co., Salford, Manchester. After suitable trials with the Clark machine, made not long since for the Edison Works at Schenectady, one has been constructed for the especial purpose of covering phonograph cylinders at the Edison laboratory, Orange, N. J.

—A traveling man tells us that Rosenberg's varnishes are especially valued by the rubber trade. We are glad to chronicle this, as we remember with pleasure a visit some time since, to their plant on 14th street, New York, where we had a very pleasant chat about gums that instead of being "tapped" from a tree are dug from the earth in far-off Zanzibar.

—We acknowledge with thanks the receipt of a handsomely framed picture of the Jersey City factories of Loewenthal & Morganstern. We learn that Mr. Lowenthal's return from Europe is looked for within the next fortnight.

—The Lambertville Rubber Co., after testing the Automatic Rubber Mixer for nearly a year, have adopted it and put in another to the great satisfaction of their "mill men" and to their own also, as it greatly accelerates the mixing of the gum.

—The New England Electric Cable Co. have enlarged their Roxbury plant and annexed a neighboring building, in which they are fitting up fine offices. Changes of this sort are always the most favorable commentaries upon the popularity of the goods made, as well as upon the enterprise of the company making the goods.

—The Northwestern Rubber Co. is the name of the new corporation that is the outcome of the joining of the Chicago agencies of the Star Rubber Co. and Hamilton Rubber Co., of Trenton. Mr. Whelpley and Mr. Edgar Whitehead are both in attendance, and together are making things "hum" in true Western fashion.

—The Newton Rubber Co., of Newton, Upper Falls, Mass., has a plant which for its completeness of equipment deserves special mention. The mill is situated on the river just below the famous "Echo Bridge" and is fitted with washers, mixing mills, calenders, presses, vulcanizers, etc., all of the latest patterns and "bran new." Their boiler was built by the Hazelton Co., of New York City, and enables them to vulcanize at a very high pressure when this is desirable, and the Putnam Machine Co., of Fitchburg, Mass., built their engine. Their specialty is the manufacture of springs, adapted to all kinds of machinery. A branch of their business is manufacturing insulating material in sheet, rod and tube, as well as boxes for secondary, or storage batteries. These boxes are in successful use on the Beverly & Danvers Street Railway, equipped by the Union Electric Car Co. of Boston. We take pleasure in thus mentioning the Newton Rubber Co., for we are glad to encourage the spirit of progress shown by them.

—Once upon a time, quite a recent time, there worked in the Philadelphia Rubber Works, five "dacint" Irishmen. Each month they bought five lottery tickets, and when the drawing came, drew blanks, and contented themselves with sighing, "Aisy come, aisy go." At length they discovered that the man of the five who bought the tickets was getting a commission for his pains, so they "bounced" him. The next month they bought four tickets, and to their astonishment drew $18,000 apiece, which they invested in homes in Philadelphia, and have lived very comfortably and sensibly ever since. But don't you, dear reader, be fool enough to invest in lottery tickets on this account!

—John A. Roeblings Sons & Co. have just issued a new catalogue of their wire, both insulated and uncovered, together with a table of sizes which shows an immense amount of careful calculation. The pamphlet is adorned by a beautiful steel engraving of the Brooklyn Bridge, which masterpiece of engineering has given them a world-wide reputation.

—When Mr. Leigh, the old superintendent of the Revere Rubber Co., was alive, he used to say, and his dignified personality gave weight to the words: "When I have anything right I never try to improve it by experimenting." Possibly in this lies the secret of the Revere's remarkable success.

—The New York Belting and Packing Co. are still pushing ahead the additions to their plant in Passaic. With this company an annex always outgrows the original plant about four times.

—The well-known vacuum-tipped arrow of the Elastic Tip Co. is on exhibition at the American Institute Fair, New York, and attracts a deal of attention. A couple of rosy-cheeked boys are in attendance, beside the regular sales agent, and they seem thoroughly to enjoy shooting their harmless missiles at a looking-glass, and observing the looks of wonder on the faces of bystanders.

—We beg to acknowledge a very handsome lithograph of the plant of the American Rubber Co., at Cambridge, Mass. It is a commentary on the business foresight of the projectors of this business that while they started in a modest way they have always had one plan in view for their model factory, and the last building, added a few months since, completes it.

—The number of Whiteheads who are engaged in the rubber business is something that is a trifle confusing to the novice. For instance, at Whitehead Bros.' factory, one meets three gentlemen bearing that name; at the Hamilton three more; at Murray, Whitehead & Murray's, still another; while in the West, at the Erie Rubber Works in Erie, Pa., are two brothers, both of the Trenton stock. In addition to this gathering is the proprietor of the Lake Shore Rubber Co., who is as much a Whitehead as any of them, not to forget Mr. Edgar Whitehead, of the Northwestern Rubber Co., of Chicago. It is not wonderful, therefore, considering the bewildering prominence that this family occupy in this business, that we gave the dimensions of the Erie Rubber Co. in our last issue, and called the factory the Lake Shore Rubber Co.

—The genial manager of the Evans Artificial Leather Co. was on his way to his factory at Salem Depot, N. H., when we stopped him to inquire about his new plant. At the risk of missing his train he gave us the desired particulars. The whole of his factory has been remodelled, until now it is one of the best equipped in the country. It has been a matter of pride with the management to put in the best machinery that can be obtained. While we write a splendid calender is being set up, and new grinders are being put in place. One of the best calender men in the East, has been secured, and Mr. Dole is happy.

—The manner in which Murray, Whitehead & Murray, of Trenton, have of late added to their plant shows genuine progress, and is fully warranted by the increasing popularity of their "Recovered Rubber." Their large engine has been practically rebuilt, a new line of grinders, a new and improved washer, and a huge fifty-foot vulcanizer set up, while their office is adorned by a mammoth safe, the whole addition forming a pleasant prophecy of their intention to keep both their trade and their ducats.

—The Home Rubber Co., of Trenton, although not by any means the noisiest of the rubber manufacturers, seem to be getting there in substantial shape. The news that prompt this reflection is an item gathered from a prominent machine man, to the effect that

they are about to put in a new two-hundred horse-power engine, and to double their present number of mixing mills. As they have just added several presses, and various plates for corrugated matting, it will be seen that their plant is most complete.

—The Providence Steam and Gas Pipe Co., report the recent introduction of over four hundred of their sprinklers in the factories of the Davol Rubber Company. This makes the thirty-eighth rubber establishment which Mr. Grinnell has thus supplied.

—It may not be as generally known in business circles as it is in literary, that Mr. Walter G. Chase, the treasurer of the Mason Regulator Co., is a frequent contributor to the Boston *Sunday Herald*. His "fad" is to take his photographic outfit, slip away from the cares of commercial life, and catch with camera and pen unique bits of life, and then allow the world the benefit of them. The *Herald's* illustrated article on the Shakers that attracted so much attention, both from the fairness with which it was written and its genuine interest, was from his pen.

—The Goodyear India Rubber Glove Co. still continue to enlarge their works at Naugatuck. Their latest addition is a large two-story brick building on the railroad side of the plant which is used as a store-house and carpenter shop.

—An exceedingly practical pattern of mixing mill for rubber is running at the works of the Boss Washer Co., Newark. It is a new design, made by Ohl & Haefner of the same city, and is so geared as to mix or sheet as the work may require. This same company have put in a set of spreading knives at the Washington Rubber Works, Elizabeth, that are giving the best of satisfaction.

—One of the most attractive exhibits of mechanical rubber goods that we have ever seen, is that of the New Jersey Car Spring and Rubber Co., of Jersey City, N. J., at the American Institute Fair, in New York. Of this display, perhaps the beautiful mats, in a variety of styles and colors, are the leading feature. At the end of the long exhibition table stands a workman at his block, punching out the hexagonal and diamond-shaped holes, and actually making a mat before the eyes of the great multitude of sight-seers, who before had been sure that the rubber had been melted and poured into moulds. The neat little cash-mat in red rubber, occupies no insignificant place in this exhibit, and it is curious to see how many seem to recognize it as an old friend that has daily saved them the bother of "thumbing" a slab of glass for a coin that lay so flat that it seemed half buried. A huge piece of suction hose, the largest smooth-hose suction ever made, attracts no inconsiderable attention, as do also the samples of general mechanical rubber goods, linen and cotton hose, etc. This company claim to be the largest manufacturers of mats and matting in the world.

—Mr. Elgin E. Lynds is just in from a large trip through the western country, and reports that the goods of the Celluloid Novelty Co., New York, not only maintain their hold on the market, but are increasingly popular.

—The Hudson *Enterprise* of recent date, contains a large and handsome illustration of the extensive new plant of the Goodyear Gossamer Co., at Hudson, Mass., together with a full description and history of the works and business of the firm.

—An alleged "English Syndicate" have approached several of the large rubber manufacturers, to endeavor to obtain refusals of their business. So far, a good deal of caution would appear to have been displayed by the manufacturers, one of whom it is stated, told his interviewer that when he knew the money was on hand, he would name his price.

—Mr. F. H. Robinson, the young rubber broker, has moved his center of operations from Trenton to the broader field of New York. His office is at 78 William street, and there his customers and friends will find him, if he does not first find them at their offices and factories.

—The owners and heads of departments at the Christopher Roberts factory, in Newark, certainly enjoy life. Mr. Roberts, the elder, may be found in Switzerland during the heated term as a rule, while his nephew has just returned from a vacation trip across the water. Mr. Underwood, the genial superintendent, tells us not to mention that he went across this summer, as "no one knows him."

—River street is a station just outside of the Boston city limits, on the N. Y. & N. E. Road, and it is there that the Boston Gossamer Co. have erected an extremely complete plant for the manufacture of their goods. The large 200 horse-engine drives four mixing mills of the best Farrel pattern, and will soon run a calender. One wing of the building will be fitted with sewing machines, so that the making-up which was formerly divided between the Boston factory and the factory at Readville, may all be done here.

—What is said to be the largest calender now in use in this country, is a portion of the equipment of Parker, Stearns & Sutton. As their large factory is built upon "made land," it was quite a feat of engineering to set their heavy machinery so that it was perfectly solid. Under the calender alone, are nearly one thousand dollars worth of brick built up in the form of a truncated pyramid.

—An instance of the interest that the Boston Rubber Shoe Co. take in their thousands of employees, is the keeping of a library for their use, to which are constantly added the books and magazines that are deemed most helpful. The library is very well patronized, and the hands are proud of it.

—The Cleveland Rubber Co., as is well known, have a big plant and modern machinery, but that evidently does not satisfy Mr. McClymonds, for he is, by additional buildings and new machinery, making it bigger and better. Before the snow flies he will have finished his alterations and additions, and will have a complete factory for the manufacture of mechanical goods, clothing and druggists' sundries in all their varied ramifications. Mr. John Bell, formerly with the Brooklyn Rubber Works, has just entered Mr. McClymond's employ, taking charge of the calendering in the Sundries Department.

—H. O. Canfield, of Bridgeport, seems to have a special faculty for suiting those who have rubber mold work to be done. His ten vulcanizing presses are kept running to the extent of their capacity, and now the rumor comes that he has been forced to put in another grinder.

—Mr. Wilson, of the Housatonic Rubber Co., is running quite a successful electrotyping business, but his pet employment is the recovering of unvulcanized fibre-scrap; and most manufacturers will acknowledge that he does it well.

—When we were young and worked in a rubber mill, we got our molds from a man named Cleves, and very good molds they were. In course of time the firm name changed, and now it is Wm. Steers, and the old Haverhill street shop, in Boston, is still the place where the business is done, although it is fitted with new machinery, and the orders are larger and come oftener.

—The Cleveland Rubber Co. have recently placed an order with J. B. Edson, 37 Liberty street, New York, for one of the Edson Steam Pressure Recorders, which have been so long used by rubber works and other steam users to reveal facts not otherwise obtainable.

—Mr. Rider, of the New York Rubber Co., returns from his trip abroad, much improved in health and without a trace of the "English" about him in style or accent.

—"Is a machine for cutting soles wanted?" This is the very practical query of many of the rubber shoe men when they are discussing the feats of the latest mechanism that does that work. As a rule the answer is in the affirmative, for notwithstanding the fact that a human cutter "books" his soles and carries them away, besides doing a number of things that his iron rival cannot be coaxed to do, the accuracy of the latter is a prime advantage. The best man that ever handled a knive varies the "skive" as his blade flashes around the pattern, but with the perfect machine it will always be the same and that's where it forges ahead.

—Apropos of the article on "Window Dressing," we wonder if those who display rubber goods are aware that one of the heaviest stockholders in the old Haywood Rubber Co. is now proprietor of the Norwich Nickel & Brass Works, and further that this company

makes a specialty of fixtures for window display. It is worth one's while to read their pamphlet on "Window Dressing," as it embodies the experiments and successes of hundreds of their customers.

—Now comes the rumor of a new clothing factory for Canada. It is to be started by a practical rubber man in the spring, and will run chiefly on fine calendered clothing.

—Now that "recovered rubber" has reached such a point of perfection, why don't some of our shrewd rubber men learn to bring the poor grades of rubber up to a higher standard? Say, for instance, take Accra Flake and turn its sticky softness into toughness. It is caoutchouc, and is related to Para. Why should it not be recovered, and made to be worth at least half as much?

—Four-roll calenders have long been in vogue, and even five, but a six-roll machine is something new. Such a calender is being built by the Birmingham Iron Works, for the new plant at Woonsocket. When running the monster machine will "friction" both sides of the cloth at once, thus doing double work. Indeed, the machine looks like two friction calenders made into one, the topmost one turned upside down.

—On Assampink Creek, close by the Delaware and Raritan Canal, stands a solid stone building that is interesting, as being the first rubber mill started in Trenton. It is the plant of the Whitehead Brothers, and since '64 has been running continuously, oftentimes night and day on "mechanical goods." Although situated in a far suburb of the "city of potters," it is rarely missed by a commercial traveler who has any excuse at all for calling there, for the air of old-fashioned hospitality that characterizes the proprietors, is so refreshing in these days of curt refusals to see goods, that the boys go away with a comfortable feeling, even if they don't sell a dollar's worth of goods.

—Mr. Frank Whitehead, superintendent of the Hamilton Rubber Co., gives his impression of the World's Fair at Paris, as far as the rubber exhibit goes, which is, that the show of mechanical goods was very poor, but that the rubber garments displayed were among the most beautiful he had ever seen.

—A new engine and boiler have been added to the enlarged plant of the Pure Para Cement Co. of Abingdon, Mass.

—The auction sale by Johnson, Moody & Co., to take place in Boston early next month, will embrace the accumulations of all kinds gathered at the mills of the largest rubber manufacturers.

—Mr. Thomas L. Fowler, who has been connected with the Ansonia Brass & Copper Co. for fifteen years as manager of its metal department, and Mr. Frank G. Stone, for the past ten years in charge of the electrical department of the same corporation, have resigned their positions in order to become respectively general manager and general sales agent of the Aluminum, Brass & Bronze Co. of Bridgeport, Conn., at the New York office, 261 Broadway. The directors of the company are: Fred. J. Kingsbury, President and Treasurer; F. J. Kingsbury, Jr., Secretary; Dr. Leonard Waldo, Electrical Engineer; and Charles S. Morse, Mechanical Superintendent. The facilities possessed by the new corporation, which, we understand, controls the exclusive United States right to manufacture under the well-known Cowles patents, should, with its present experienced staff, vouchsafe for it a brilliant position in the near future.

Among the Traveling Men.

MR. VIRTUE, so well known as a popular salesman for the Barbour Thread Co., has taken an interest in a prosperous factory in Lynn, which was formerly run under the firm name of Nulchur & Spinney. The new name will be Spinney, Virtue & Co. Mr. Wise, who has management of the factory, is also a member of the firm, but quaintly observing that so unusual a thing as a firm that had Virtue and was also Wise, would be too much, he insisted upon being called simply Co. On the retirement of Mr. Virtue from the Thread Co., he was presented by the management with an elegant roll-top desk, which occupies a conspicuous place in his new office, and of which he is justly proud.

—Mr. Fred Jones, one of the bright young men who travel for the Tyer Rubber Co., is at present doing Texas. We are not advised as to whether he carries his grip in one hand and a "gun" in the other, but to use an expression that has a far-away sort of familiarity, we venture to predict that he will "get there."

—The boys were all saddened by the sudden death of Fred Doty, who, although so young, gave promise of being a very bright and successful salesman. He had a host of friends, both among customers and associates, and many a sigh goes up at thought of the sudden accident that cut short a life so full of promise.

—Mr. R. H. Morrell, the energetic head salesman of the Standard Rubber Co., has been trying for a month past to get away on his usual fall trip West, but business has been so brisk as to hold him in New York. By the time this goes to press, however, he will be on his way, the trip being more a series of friendly visits than anything else, for trade is so good that the Standard is running night and day to fill orders. Mr. Morrell's new quarters, at 99 Franklin street, New York, in the handsome Watson Building, elicit many compliments. In addition to his private office, he has a dainty room for the silk garments, a larger room for regular stock, and a stock room as large as all three combined.

—Mr. J. C. Danforth, the well-known and popular head salesman of the Warner Brothers, predicts a big sale for the Canfield Dress Shields this season. He carries the three styles, known as the "Canfield," the "Coronet," and the "Para." In his predictions, Mr. D. usually comes out about right, for if he finds a statement that he has made for future fulfillment is likely to fall short of its full fruition he has just the commercial ability to bring it up to its duty. By the way, he is to be married shortly. Congratulations, old fellow!

—No doubt by this time most of the manufacturers of mechanical rubber goods have made the aquaintance of a very unassuming Scotchman, by the name of Alexander Stewart. We write this item as a warning to them, a warning not to let him go without examining his new colors made especially for rubber work, and to withstand the slackening effects of heat and sulphur. Mr. Stewart represents F. W. Devoe & Co., of New York.

—Mr. F. G. Burgess, for some time traveling salesman for the Mattson Rubber Co., has just taken a position with a Boston house.

—Mr. F. S. Brooks, of the Gutta Percha and Rubber M'f'g Co., has established his headquarters permanently at 283 Seventh street, Buffalo, in order that he may look after the territory in and about Western New York.

Asbestos—Amianthus.

BY JULES C. DESBARRES, BACHELIER DES SCIENCES.

ASBESTOS, originally found in Cyprus and in Corsica, is a mineral, a variety of the amphibole or hornblende family, and akin to tremolite and augite or pyroxene. It takes its name from the Greek *asbestos*—inextinguishable, for it possesses the property of resisting fire. It is also called amianthus, or mountain-flax, Greek *amiantos*—undefiled, though this term should be made to apply solely to the whiter and more delicate, satin-like, varieties of asbestos.

Mineralogically speaking, Asbestos is a fibrous silicate of calcium and magnesium. It consists of silica, magnesia, lime, oxide of iron, alumina, soda and potash, and its most familiar allies are soapstone, mica, pumice-stone and hornblende. It occurs in veins in the serpentine and other primary formations, and is distributed pretty much throughout the entire earth.

The most valuable deposits have been found through serpentine veins in the valleys of the Valtelline and of Aosta, as well as in Cornwall, Silesia, Switzerland, in New South Wales, and in Upper Saxony, although very good lines exist also in the metalliferous beds of Bohemia, in the micaceous slate veins at Glenelg in Inverness

and in the veins of gneiss and mica slate throughout the French Departments of Isère, Drôme and Hautes Alpes. A description of very elastic asbestos fibre is found in the Tarentaise of Savoy, whilst varieties known as *fossil cork, fossil leather, fossil flesh, fossil paper, woody asbestos, chrysotile*, and by other names, come from Canada, the United States, South America, the Cape of Good Hope, Japan, Spain, France, Hungary, the Tyrol, the Hessian Odenwald, the Ural Region, Piedmont, Savoie and Haute Savoie, the islands of Cyprus and of Corsica, from Salzburg, Sweden, Persia, Siberia and Greenland. But of what is called commercial asbestos, the largest deposits worked at the present day are to be found in Italy and in Canada.

The magnitude of the Canadian output may be realized from a report made not long since through the Toronto *Empire*, to the effect that the comparatively few mines now worked yield as much as 4,000 tons yearly, of grades ranging in value between $80 and $120 per ton. All the mines at present worked are situated in the two counties of Megantic and Beauce in the Province of Quebec, though veins are known to exist in other counties of the same province, and discoveries may not improbably be made in parts of New Brunswick where there is the same geological formation. Besides being very productive, these veins contain asbestos which is not excelled for purity and quality by any in the world. Much of it when crushed out, is a pure white, flexible, silky fibre, well fitted to be spun and woven for the more delicate fabrics for which it is used.

Prof. M. J. Durst who has made a special study of this product, says that the solid abestus rock is about 2.44 in specific gravity, of brown, reddish and greenish tints of color, to almost white, and is easily broken transversely into fragments or splinters, which in the finer grades are readily reduced between the fingers to a beautiful cotton-like mass of fibre, while the coarser varieties have a woody appearance, with fibres from one foot to three and even four feet in length, and may easily be mistaken by inexperienced persons for forms of petrified wood, especially so when iron is present to give it the reddish color of decayed wood or bark. But the microscope quickly detects the crystal fibre and the entire absence of vegetable cells, which are always found in petrified wood. A single fibre of asbestos fuses under the blow-pipe into a white enameled glass or an opaque globule, but some varieties of the mass have been known to resist heat to 2,000, and 3,000 and even 4,000 degrees Fahr., without any visible effect.

Analysis shows following comparative results:

	Canadian.	Italian.
Silica,	40.92	40.25
Magnesia,	33.21	40.18
Water of Hydration,	12.22	14.02
Alumina,	6.69	2.82
Protoxide of Iron,	5.77	.75
Soda,	.68	1.37
Potash, etc.,	.22	.15
Sulphuric Acid,	traces	.31

Thus, while the Italian contains a larger percentage of Magnesia, it is poorer in Alumina and holds more water than the Canadian. The best varieties of Italian, though scarce, are obtainable in masses of long fibres, sometimes reaching three feet, but these cannot be worked with the ease and evenness of the Canadian. The product is likewise not so uniform, while its greater density and weight renders it less desirable and more expensive for general uses.

In the Canadian Asbestos, the fibrous crystals are not so long, ranging generally from three to six inches, but are finer, more flexible and silky-greasy to the touch, easily separable and capable of being made into yarns, threads, cloth, paper, etc., etc.

The mineral may properly be divided into three classes: First, the coarse, brittle and compact variety, very plentiful and of comparatively little value; Second, that possessing well defined fibres of a yellowish brown color, fragile and containing many foreign bodies; Third, the fibrous pure white and silky description, easily separable and adapted to the manufacture of textile or woven goods.

The fire-proof quality of Asbestos is its distinguishing characteristic, but it is also a non-conductor of electricity, and in its separated and flocky condition, is a good non-conductor of heat, while it is insoluble in any of the ordinary acids.

The art of drawing the asbestos fibres into threads and then weaving them into cloths, was known to the ancients whose writers have made numerous references as to their use. Herodotus, "the Father of History," 484–408 B. C., alludes to the cloth woven of amianthus by the Egyptians, who employed it to wrap the bodies of the illustrious dead on the funeral pile, that their ashes might not come in contact with the ashes of the wood, whilst Varro and others, alluded to in the Annals published elsewhere, likewise make reference to either the spinning of the cloth or to many of its various applications.

Plutarch and Strabo allude to the "asbesta" or perpetual lamps, which maintained the sacred fire in the ancient temples, and Pausanias speaks of the golden lamp for Minerva, which, though it was kept ever burning, night and day, was only "once a year supplied with oil, and had a wick made of Caspian linen—the only linen which is not consumed by fire."

Strabo likewise alludes to napkins made of the Carystian stone, which, when soiled, were thrown into the fire and cleansed as others are by washing.

It is said that Charlemagne, A. D. 742–814, had a table cover of amianthus, which he would often take delight throwing into the fire after dinner, to the astonishment of his guests; and, at this date, are to be seen in many museums, notably in those of the Vatican and of Naples, pieces of cloth, napkins, sheets and shrouds of the same material dating back to the time of the Roman Emperors.

In the applications made of asbestus at the present day, advantage is taken of its acid-resisting, as well as of its fire-resisting qualities. These applications are so very numerous and of such importance that they must needs form a separate and much more extended article which will appear in a later number of THE INDIA RUBBER WORLD.

United States Patents.

On receipt of 25 cents we will mail one copy of the specifications of any U. S. Patent issued since 1866. Give number and date of patent.

410,304-8.—Pyroxyline Compounds and Varnishes. Chas. B. Schupphaus, Adams, Mass.
411,326.—Packing for Journals. H. B. Devlan, Jersey City, N. J.
411,384.—Packing for Steam Pipes. Chas. F. Lee, Boston, Mass.
411,792.—Rubber Syringe. A. C. Eglers, Brooklyn, N. Y.
411,793-4.—Bottle Nipple, Nursing. A. C. Eglers, Brooklyn, N. Y.
411,795.—Bottle Stopper, Water. A. C. Eglers, Brooklyn, N. Y.
411,900.—Machine for Covering Wires or Cables. J. McCahey, Providence, R. I.
411,910.—Rubber Tooth Brush. H. E. Van Horne, New York, N. Y.
413,622.—Rubber Dam, Clamp and Carrier. J. W. Ivory, Philadelphia, Pa.

UNITED STATES TRADE MARKS.

17,100.—Shoe Elastic. Herbert & Rapp Co., Boston, Mass.
17,107.—Hose, Hydraulic. Eureka Fire Hose Co., New York, N. Y.
17,156.—Wearing Plates. Hartford Heel Plate Co., Hartford, Conn.

—A new and especially successful "recovered rubber" for insulating wire, is the gum, made by Murray Whitehead & Murray, of Trenton, N. J.

—Mr. B. F. Sutton, of Parker, Stearns & Sutton, has been confined to his home for a fortnight past nursing a broken collar-bone. In attempting to board a street car near Fulton Ferry, Brooklyn, he was caught between two cars running in opposite directions, and owing to the nearness of the track at that point, he was severely crushed, breaking the right collar-bone. We are glad to say, however, that the bone has been healing nicely since the accident and he expects to get about now in a few days.

QUOTATIONS

FOR PIGMENTS, SOLVENTS, ETC., EMPLOYED IN THE INDIA RUBBER AND GUTTA PERCHA INDUSTRIES.

NOTE.—Every article herein named has been used in compounds for India Rubber and Gutta Percha. The accompanying quotations have been especially prepared and will be duly revised exclusively for THE INDIA RUBBER WORLD, and they represent current prices for average small orders. The publishers will be pleased to put buyers into communication with manufacturers of any of the articles quoted and no charge whatsoever, directly or indirectly, will be made for that service to either party.

Acetone, b. p. 57° c.	per lb.	$1 50
Acid, Abietic	per gm.	2 00
" Acetic	per lb.	0 08
" Benzoic, Germ	per lb.	0 65
" Boracic	per lb.	0 26
" Carbolic, Com.	per lb.	0 60
" Cholalic	per lb.	0 40
" Chromic	per oz.	0 11
" Formic	per lb.	1 00
" Gallic	per lb.	1 30
" Hydrochloric	per lb.	0 03
" Nitric, 38°	per lb.	0 40
" Oleic, pure	per lb.	0 40
" Oxalic	per lb.	0 50
" Phosphoric	per lb.	0 50
" Silicic	per lb.	0 75
" Sulphuric	per lb.	0 15
" Tannic	per oz.	0 30
" Tungstic	per lb.	0 40
Actinium, Sulphide		
Alabaster Dust	per ton,	18 00
Albuminous Substances. *See* Casein, etc.		
Alcohol, Wood	per gal.	1 45
Alkalies, *See* Ammonia, etc.		
Alkanet, Root, powd	per lb.	0 22
" (Anchusin) paste	per lb.	6 50
Alum, lump	per lb.	0 02
" powdered	per lb.	0 06
Alumina, Sulphate	per lb.	1 00
Aluminium, Abietate		
" Acetate	per lb.	0 30
" Sulphate	per lb.	0 75
Alum. Earth, *Bauxite*	per ton,	8 00
" " Corundum	per lb.	
Ammonia, *See* Spirit.		
Ammonium, Bichromate	per lb.	1 20
" Carbonate	per lb.	0 09
" Chloride	per lb.	0 40
" Chlor. powd	per lb.	0 18
Aniline, Salt	per lb.	0 60
Anthracene	per oz.	0 12
Antimony, Sulph. black	per lb.	0 10
" " golden	per lb.	0 40
" (Kermes) Sulph. red	per lb.	1 25
Arrow Root, Jamaica	per lb.	0 20
Arsenic, Red Sulph. (Realgar)	per lb	0 10
" Yel. " (Orpiment)	per lb.	0 15
Asbestine	per ton,	$20 @ 22 00
Asbestos, powdered, No. 3	per lb.	0 05
" short fibre, No. 3	per lb.	0 08
Asphaltum, *See* Gum.		
Assafœtida, *See* Gum.		
Azo-Benzol, Merck	per oz.	1 25
Balsam, Canada	per gal.	3 25
" Styrax	per lb.	0 30
" Sulphur	per lb.	0 40
Barium, Peroxide	per lb.	1 00
" Sulphate	per lb.	0 06
Benzol, Coal Tar	per lb.	1 00
Bismuth, *See* Glance.		
Bitumen, *See* Pitch, Mineral.		
Black Pigment, dry	per lb.	0 12
Bleaching Powd. *See* Lime Chlor.		
Blue Pigment	per lb.	0 30
" Ultramarine	per lb.	0 15
Bole, powdered	per lb.	0 12
Bone, Black, *See* Charcoal.		
" Dust, by bbl.	per lb.	0 02
Borax, lump, by bbl.	per lb.	0 08
" powdered	per lb.	0 09
Boron (Borium), crys	per gram.	4 00
Brimstone, *See* Sulphur Rolls.		
Bromine, Chloride	per oz.	0 75
Brown Pigment, dry	per lb.	0 04
Cadmium Sulphide	per oz.	0 50
Calcium Chloride	per lb.	0 40
" Sulphide	per lb.	0 40
Calomel	per lb.	2 80
Camphene, *See* Turpentine.		
Camphor, *See* Gum and Oil.		
Caoutchoucene		
Carbon Bisulphate	per lb.	0 15
" Bisulphide	per lb.	0 11
" " highly rect'd	per lb.	0 20
" Trichloride, liq	per oz.	0 75
" " crys	per oz.	1 20
Casein (Caseum)	per lb	0 80
Catechu, *See* Gum.		
Ceresin, *See* Wax Min.		
Chalk, Carbonate, Am.	per lb.	0 09
" Precip., Engl	per lb.	0 08
" French, powd	per lb.	0 04
Charcoal, Anim. purif.	per lb.	0 06
" Anim. powd.	per lb.	0 03
" Fine Willow	per lb.	0 12
Chlorine Water	per lb.	0 12
Chloroform, Purified	per lb.	0 90
Chrome, *See* Lead and Zinc Chromates.		
Chromium, Oxide	per oz.	$0 30
Cinnabar, *See* Mercury.		
Clay, China (Kaolin)	per lb.	0 03
" Pipe, powdered	per lb.	0 10
Cocoanut Fibre		
Colcothar, *See* Iron.		
Collodion	per lb.	0 76
Colophony *See* Resin.		
Copper, Oxide, Black	per lb.	0 90
" " Red	per lb.	1 25
" Sulphate	per lb.	0 05
Cork, granulated	per lb.	0 05
Cutch, Catechu, *See* Gum.		
Creosote, Creasote	per lb.	0 60
Dextrine, all shades	per lb.	0 09
Emery Cloth, all Nos	per rm.	7 25
" Powder, by keg	per lb.	0 03
Ethyliden, Chloride	per oz.	1 00
Ether, Acetic	per lb.	0 65
Eupione, Mercks'	per gm.	0 35
Extract Cochineal	per lb.	1 25
" Indigo, best	per lb.	0 60
" " ord	per lb.	0 09
" Lake Liquor		
" Logwood	per pt.	0 60
" Mulberry, Fig	per lb.	0 30
Farina	per lb.	0 07
Feldspar, powdered	per lb.	0 10
Fibres, *See* Cocoanut, etc.		
Fibrin, Mercks', blood	per gm.	0 20
" " plants	per gm.	0 25
Flint Dust, by bbl.	per lb.	1 20
Formyle, *See* Acid Formic.		
Fuller's Earth, powd	per lb.	0 08
Galena, *See* Lead Sulphide.		
Gelatine, Cooper's sheet	per lb.	0 85
" French white	per lb.	0 80
Glance Bismuth	per oz.	0 60
" Copper	per lb.	1 00
" Silver	per oz.	3 00
Glass Liquid	per lb.	0 05
" Powdered	per lb.	0 08
Glue, Cooper's A. Ex	per lb.	0 24
" Isinglass, Am	per lb.	0 85
Gluten, Vegetable	per oz.	0 25
Glycerine	per lb.	0 25
Gold, Chloride and Sodium	per oz.	6 12
" Oxide	per oz.	24 50
Granite, Marble Dust	per bbl.	1 10
Graphite, purified	per lb.	0 75
Green Pigment, dry	per lb.	0 20
Gum Arabic	per lb.	0 90
" Asphaltum	per lb.	0 10
" Assafœtida	per lb.	0 15
" Benzoin	per lb.	0 60
" Camphor	per lb.	0 40
" Catechu	per lb.	0 25
" Copal	per lb.	0 30
" Damar	per lb.	0 25
" Elemi	per lb.	0 25
" Euphorbium	per lb.	0 20
" Gamboge	per lb.	0 65
" Juniper	per lb.	0 40
" Kowrie	per lb.	0 40
" Mastic, powd	per lb.	1 15
" Sandarach	per lb.	0 40
" Sanguis Draconis	per lb.	0 35
" Shellac, native	per lb.	0 23
" " bleached	per lb.	0 16
" *See* also Balsam, Resin.		
Gutta Percha Solution, *See* Traumaticin.		
Gypsum, *See* Alabaster, etc.		
Hemp Fibre	per lb.	0 14
Honey, Strained	per lb.	0 12
Horn Dust, Shavings	per lb	0 06
Infusional Earth, domestic	per lb.	0 06
" " foreign	per lb.	0 08
Ink, India	per lb.	2 00
Iodine, Chloride	per oz.	0 70
" Resublimed	per lb.	4 00
Iron, Carburet, *See* Graphite.		
" Carbonate	per lb.	0 32
" Filings of	per lb.	0 10
" Oxide, black	per lb.	0 40
" " red (Colcothar)	per lb.	0 12
" Sesquichloride	per lb.	0 60
" Sulphide	per lb.	0 15
" Tungstate (Wolfram)	per lb.	0 30
Isinglass, *See* Glue.		
Ivory Black, *See* Charcoal.		
Jute Fibre	per lb.	0 05
Kermes, *See* Antimony.		
Lamp Black, B. & S	per lb.	0 06
" " Eddy	per lb.	0 20
" " Germ	per lb.	0 10
Lead, Abietate		
" Acetate (Sugar of Lead)	per lb.	$0 13
" Black, Am	per lb.	0 04
" Carbonate (Wh. L.)	per lb.	0 06
" (Fl. White)	per lb.	0 15
" Chromate, powd.	per lb.	1 10
" Hyposulphite(Thiosulphate)	"	0 70
" Oxides, *See* Litharge, etc.		
" Peroxide (Puce)	per lb.	0 60
" Sulphate	per lb.	0 40
" Sulphide	per lb.	1 35
" Tannate	per oz.	0 30
Leather, Sole, powd	per ton	11 00
Licorice, Calabria	per lb.	0 30
" American	per lb.	0 16
Lignine, *See* Fibrin, etc.		
Lime, Carbonate, *See* Chalk.		
" Caustic	per lb.	0 50
" Chlorinated	per lb.	0 63
" Phosphate	per lb.	0 25
" Spec. Prep	per lb.	0 03
Litharge, American	per lb.	0 06
" Foreign	per lb.	0 12
Magnesia, Carb., powd	per lb.	0 35
" Oxide	per lb.	0 30
" Silic., *See* Chalk. Fr.		
Manganese, Black Ox	per lb.	0 40
" and Iron, Chl	per lb.	0 30
Mass, *See* Iron Carbonate.		
Mercury, Bi-cyanide	per oz.	0 40
" Bi sulph. (Cinnabar)	per lb	1 30
" Ferro cyanide	per oz.	1 50
" Red Oxide	per lb.	1 60
" Sub-chloride, *See* Calomel.		
" Sulph., *See* Vermilion.		
" " Black	per lb	0 80
" Sulpho-cyanide	per oz.	0 30
" with Magnesia	per lb.	1 15
Methylene, Chloride	per oz.	0 60
Mica, ground, med	per lb.	0 10
Mineral Wool	per ton	20 00
Minium	per lb.	0 06
Musk, Chinese	per oz.	0 45
Naphtha, Wood	per lb.	0 35
Naphthalene, Wht, Resublimed	per lb.	0 25
Naphthol, White	per lb.	1 30
Nickel, Sulphate, Ammoniated	per lb.	0 75
Nitro benzol	per lb.	0 60
Oil, Camphor	per lb.	0 37
" Caraway	per lb.	1 10
" Castor, Am	per lb.	0 12
" Cocoanut	per lb.	0 16
" Colza	per gal.	0 62
" Cottonseed, Y. W	per gal.	0 60
" Dippel's (Bone)	per oz.	0 30
" Eucal, Glob	per lb.	2 00
" Linseed, boiled	per gal.	0 55
" " raw	per gal.	0 50
" Musk	per oz.	0 75
" Neatsfoot	per gal.	0 75
" Palm	per lb.	0 06
" Paraffin	per gal.	0 20
" Peanut	per gal.	1 40
" Rapeseed	per gal.	0 64
" Resin, rect	per lb.	0 45
" Tar, Birch	per gal.	0 30
" Tar, Lignite	per lb.	1 00
" Thyme, White	per lb.	1 00
" Turpentine	per lb.	0 35
" Vitriol, *See* Ac. Sulph.		
" Walnut	per lb.	0 40
Orpiment, *See* Arsenic.		
Orris Root, powd	per lb.	0 16
Oyster Shells, ground	per lb.	0 15
Ozokerite	per lt.	0 25
Paper, Filter, Sand	per rm.	4 25
" Nat., Emery	per rm.	6 25
" Pulp	per lb.	0 04
Paraffin, *See* Oil, Wax.		
Paranaphthaline, *See* Anthracene.		
Paris, White, by bbl.	per lb.	0 01
Pearlash, *See* Pot. Carb.		
Petroleum, Am. Med	per gal.	0 09
" Ether	per pt.	0 40
Phosphorus	per oz.	0 50
Pigments, *See* Blue, etc.		
Pinol, L. & F	per lb.	6 00
Pitch, Black, by bbl	per lb.	0 04
" Auvergne		
" Burgundy	per lb.	0 06
" Egyptian	per lb.	0 09
" Mineral	per lb.	0 15
" Trinidad	per ton.	35 00
Plaster Paris	per bbl.	1 50
Plumbago, *See* Lead, Black.		
Potash	per lb.	0 06
Potassa, Caustic, com	per lb.	0 50
" " and Lime	per lb.	0 70
Potassium, Arseniate	per oz.	0 10
" Bichromate	per lb.	0 12
" Carbonate	per lb.	0 08
" Nitrate	per lb.	0 13
" Sulphide	per lb.	0 22
Pumice Stone, *See* Stone.		
Prussian Blue	per lb.	0 90
Pyroxylin, spec. prep	per oz.	0 35
Realgar, *See* Arsenic.		
Red Pigment, super	per lb.	0 09
Resin, *See* also Gum.		
" Dark (Colophony)	per lb.	0 06
" White	per lb.	0 04
" Yellow	per lb.	0 03
Rhigolene, *See* Pet. Ether.		
Salt, *See* Sod. Chloride.		
Sand, Fine, White	per bbl.	1 30
Sawdust, v. fine	per bbl.	0 25
Sea Weed, Tang	per lb.	0 90
Selenite, powd	per oz.	0 15
Selenium	per oz.	3 00
Sienna, burnt and powd	per lb.	0 02
Silica, *See* Ac. Silicic.		
Silver, Metallics	per lb.	1 30
Slate, pulverized	per bbl.	0 70
Soap, Castile, White	per lb.	0 12
" Olive, Soda	per lb.	0 08
Soap Stone (Steatite)	per lb.	0 05
Soda Ash (Bicarb)	per lb.	0 02
" Caustic	per lb.	0 03
Sodium, Bi-borate	per lb.	0 80
" Bi-chromate	per lb.	0 25
" Chloride	per lb.	0 30
" Hydrosulphide	per lb.	0 70
" Metallic	per oz.	0 35
" Nitrate	per lb.	0 14
" Silicate, *See* Glass Liq.		
" Sulphate	per lb.	0 20
" Tungstate	per oz.	0 09
Spar, *See* Barium Sulph.		
Spirits, Ammonia	per lb.	0 47
" Camphor	per lb.	0 50
" Turpentine	per gal.	0 45
Sponge Cuttings	per lb.	0 15
Starch, Corn, pulv	per lb.	0 06
" Pure, by bbl	per lb.	0 05
Stearine	per lb.	0 17
Steel Filings	per lb.	0 12
Stone, Pumice	per lb.	0 03
" Rotten	per lb.	0 07
Sulphur, Chloride	per lb.	0 80
" Flowers, wash	per lb.	0 07
" Liver, *See* Pot. Sulph.		
" Precip., pure	per lb.	0 11
" Rolls, by bbl	per lb.	0 02
Talc, *See* Chalk, French.		
Tallow	per lb.	0 04
Tannin, *See* Acid Tannic.		
Tapioca, Pearl	per lb.	0 07
Tar, Common	per bbl.	3 00
" Stockholm	per lb.	0 12
Terra Alba	per lb.	0 08
Tin, Bi-chloride	per oz.	0 15
" Bi-sulphide	per oz.	0 25
" Muriate	per lb.	0 40
Toluene, Toluol	per lb.	0 60
Tonka Bean	per lb.	1 60
Tortoise Shell, powd	per lb.	0 03
Traumaticin, Mercks'	per oz.	0 20
Tripoli, Mt. Eagle	per oz.	0 65
Tungsten, Oxide, pure	per oz.	0 40
Turpentine, Chian	per oz.	0 50
" Camphene	per gal.	0 35
" Venice	per lb.	0 19
Umber, burnt and powd	per lb.	0 02
Varnish Settlings	per gal.	0 23
Vegetable Black, spec. prep	per lb.	0 10
Vermilion, American	per lb.	0 18
" English	per lb.	0 60
Vitriol, *See* Copper Sulphate.		
Wax, Carnauba	per lb.	0 16
" Japan	per lb.	0 15
" Mineral	per lb.	0 16
" Paraffin	per lb.	0 05
" White	per lb.	0 45
Whalebone, ground	per lb.	0 25
Whiting, by bbl	per lb.	0 01
Wolfram, *See* Iron.		
Wood Pulp, ground	per lb.	0 02
Yellow Chrome, *See* Lead Chromate.		
" Pigment, dry	per lb.	0 06
Zinc, Abietate		
" Chromate	per oz.	0 25
" Oxide, G. Seal	per lb.	0 08
" " R. Seal	per lb.	0 07
" Sulphate	per lb.	0 07
" Sulphide	per lb.	0 18

Insulated Wires.

BY HERBERT LAWS WEBB.

RECENT events have made this subject one of peculiar interest. Things have come to a pretty pass when we are told, on the authority of one who is regarded by the popular mind (on this side of the Atlantic) as the foremost electrician of the day, that the safe insulation of conductors carrying high-tension alternating currents is an absolute impossibility. In the present state of electric lighting affairs it would be difficult to conceive a more mischievous assertion, especially since so much publicity has been given to it, and its source is such as to carry weight with the untechnical and unreasoning public. A friend (engaged in purely commercial pursuits) said to me the other day in the course of a chat over the excitement about the wires: "They want to do away with those highly-insulated wires, don't they?" Of course he meant "high tension," but the majority of newspaper readers, and, for that matter, of newspaper writers also, have just as clear an idea of the merits of the discussion as my friend had; and with a few more alarmists like Mr. Edison in the field, the public will soon come to look upon every electric wire as a menace to life and property. In one of the interviews recently published in a New York daily, Mr. Edison cited the Atlantic cables as "the highest case of insulation known," and added that the cable companies make it an iron-clad rule never to use a pressure of more than forty volts for fear of injuring the insulation. A comparison between electric light conductors and Atlantic cables is absurd in the extreme. It would be just as sensible to urge that because the cars on Brooklyn Bridge are not run above a certain speed for fear of injuring the structure, therefore no bridges can be built over which express trains can be run, and express trains should be abolished. The Atlantic cables are in one continuous length of over two thousand miles: that everybody knows; the insulation makes perfect contact with ground with its entire outer surface: that everybody does not know; and lastly, the insulation of a cable submerged at a depth of several thousand fathoms is subject to an enormous pressure amounting to several tons to the square inch: that very few people know and still fewer take into consideration. It is this tremendous pressure that renders necessary such extreme caution in operating submarine cables lying in deep water. Let there be ever so minute an air-bubble in the gutta-percha, or between the gutta-percha and the conductor—and the utmost care in manufacture will not eliminate them all—under this pressure it will gradually be forced through the gutta-percha, perhaps not entirely through but so far towards the outer surface as to create a weakening of the insulation at that point which will readily develope into a fault, and break the cable down. When the immense difficulty and cost of repairs to an Atlantic cable are taken into consideration, to say nothing of the loss entailed by interrupted service, it is not surprising that the companies use every possible precaution to avoid overtaxing the strength of their lines, already more than sufficiently tried by the elements. On the other hand, wires for electric lighting are employed under widely different conditions. Firstly, as electric light engineers have not to deal with the difficulty of electro-static capacity, nor have they to keep down the weight and diameter of their insulation for mechanical reasons, they can use much heavier insulation than is ever employed for submarine cables. The insulation resistance of some of the Atlantic cables averages somewhat less than 2,000 megohms per mile. Electric light companies can be supplied with mains having an insulation resistance of from 8,000 to 10,000 megohms per mile. Secondly, wires for electric lighting can be insulated at their supports in addition to the covering of insulating material. Thirdly, they can easily be got at for inspection and repairs, which is not the case with submerged submarine cables. Fourthly, electric light wires are used only in very short lengths compared with the length of an Atlantic cable. The total insulation resistance of an Atlantic cable is about one megohm, whereas the total insulation resistance of several miles of first-class electric light cable should be several thousand times as much. It may also be added that although forty volts is the working pressure used on the Atlantic cables, no cable electrician would hesitate to employ a current of two or three hundred volts pressure on the same type of cable laid in shallow water if such a course were necessary, and some manufacturers of submarine cables test the insulation of their cables at a pressure of 2,500 volts before sending them out of the factory.

It will be seen that Mr. Edison's reference to the Atlantic cables as an argument against the use of high-tension currents does not bear investigation, and his qualification of them as "the highest case of insulation known" is anything but exact.

With regard to Mr. Edison's statement that no insulating material can withstand the molecular disturbances created in the conductor by the alternating current, some recent experiments made by Mr. Preece, described at the Newcastle meeting of the British Association* do not seem to entirely bear out this view. Mr. Preece says: "The difference of behavior between iron and copper is very marked in the sounds they emit when transmitting alternate currents. Iron vibrates mechanically, and emits loud, powerful sounds, filling the room with a roar, and increasing in intensity with the frequency. The sound of copper is very slight, and only perceptible when the ear is close to the conductor, even with the maximum current. It is only what one would expect from such rapid variations in emissivity under such alternations.

"This vibration, so marked *in iron*, has a very important bearing on the durability of the insulating material; for it is difficult to conceive any material that could stand such molecular disturbances without injury for any length of time."

But nobody uses iron for electric light conductors, and as the first paragraph clearly states that the vibration is much less in copper than in iron, consequently the durability of the insulation is not affected to such a great extent as has been stated.

Mr. Preece sums up as follows: "The general conclusion to be drawn from these experiments is that practically no serious error has been made in the form of conductors so much used for alternating-current systems, and that nothing cheaper or better has been devised than a simple stranded conductor, coated with a suitable insulating covering, and

* "On the Relative Effects of Steady and Alternate Currents on Different Conductors." By W. H. Preece, F.R.S.

protected outside with lead, or some impervious and strong material."

The real cause of the present crisis in electric lighting affairs is to be found, not in the use of high-tension alternating currents nor in the impossibility of properly insulating conductors transmitting such currents, but in faulty and hasty construction and the use of cheap and defective materials. In England high-tension alternating currents are used to a great extent, and so far no serious troubles or dangerous accidents that can be directly traced to them have occurred. Contrary to what has been stated in various quarters during the recent discussion in the New York papers, there exists in England no regulation, local or otherwise, restricting the tension of electric currents, whether continuous or alternating, for lighting or power purposes. The Board of Trade regulations recently issued are directed towards securing every possible safeguard both as regards the insulation of the wires and the proper construction of overhead circuits, and they also prohibit the placing of electric light and power wires on the same supports with those of the telephone or telegraph systems. It is only right to say that the English companies have always adopted these precautions in their own interests, and the immunity from accidents which they have enjoyed is entirely due to superior construction and the use of high-class material. It would perhaps astonish the managers of electric light companies on this side to know that the English central station companies use heavily insulated wires for their mains which cost them upwards of $1,000 per mile. But until the New York companies make up their minds to abolish "undertaker's" wire, to loosen their purse-strings and invest in trustworthy material, and to exercise proper engineering skill in the construction of their circuits, they will not arrive at a solution of the difficulties which at present beset them.

Current Electrical Gleanings.

BY LIGHTNING ARRESTER.

TO judge from newspaper talk, telephone interests would seem to be in a bad way. The Drawbaugh claim is said to be arising like a tardy Phœnix from its ashes, and through the press we learn strange stories of fraud and confident assurances that the battle is to be fought out to the bitter end. The "bitter end" of the whole business will inevitably remain, as it always has so far, in the grasp of the Drawbaugh people.

* * *

A meeting of telephone subscribers was held lately to inaugurate a movement in favor of a reduction of telephone rates. It is wonderful what a lot of enemies a telephone company has to encounter. Overhead the wires are crossed by electric light wires and subscriber's telephones, and exchange apparatus are burned out with periodical frequency, while occasionally the unoffending telephone wires are converted into instruments of death. Underground, the costly cables are damaged by steam heat, and in towns where electric railroads flourish the telephone companies are accused of "wanting the earth" because they endeavor to prevent the electric railroad people from using such a system as would entirely ruin the telephone service. And now when the Metropolitan Telephone Company is spending a vast amount in putting down an extensive underground system, the subscribers combine with a view to reducing the rates.

* * *

A gentleman recently wrote to an English periodical, pointing out, for the benefit of theatrical managers, that electricity does not heat theatres. He attended a performance at a theatre lighted by electricity and suffered greatly from draughts. Nobody claims that the electric light does heat a theatre, in fact that it does not is held to be one of its great advantages for theatre lighting. But to hold it responsible for creating draughts, or to expect it to be capable of counteracting their evil effects is asking a trifle too much—even for electricity.

* * *

In an article on telegraph rates in the current number of the *North American Review*, Dr. Norvin Green says, speaking of the telegraph abroad, that "a few of the longer submarine cables are owned and controlled by private corporations." It would have been more correct to say that a few of the shorter cables are owned and controlled by government administrations. Of the entire submarine cable system of the globe nine-tenths are owned and controlled by private companies. The exact figures are: Government administrations, 12,533 nautical miles; private companies, 107,546 nautical miles.

* * *

Newspaper science is truly a fearful and a wonderful thing. The other day, the *Herald* described a small portable electric light outfit for medical purposes, recently devised by a young Brooklyn doctor, for the benefit of its scientific readers. The Herald stated that the battery has a storage capacity of *five ohms!* The same paper, in an editorial on the proposed cable road for Broadway, says that "cable traction is generally conceded to be superior to electric propulsion." If the writer had studied the proceedings of the last meeting of the American Street Railway Association, he would not have written such nonsense. Electric traction is as superior to the cable method as the cable is to horses.

* * *

The issue of the *North American Review* referred to above is strong in electrical articles. It contains, besides that of Dr. Norvin Green, two others, which, however, are really advertisements pure and simple—one by Harold P. Brown, of himself; and the other by Thomas A. Edison, of the Edison system of incandescent electric lighting.

* * *

A notable addition to the ranks of the consulting branch of the electrical profession in New York is that of Mr. Charles Cuttriss, the well-known electrician to the Commercial Cable Company. Mr. Cuttriss's specialty will be cable work, and now that so much attention has been drawn to the necessity of good insulation, that underground work is progressing so fast and that thorough and reliable testing is becoming recognized as a *sine qua non*, he ought to find a good field for his services.

* * *

The young man who wrote up the account of the recent "deadly wire" accident for the *Commercial Advertiser*, excelled himself and fairly out-Heroded Herod. Quoth he, after a column of highly sensational description: "Even after it was cut and pulled down from the pole the wire blazed and sputtered in the gutter for half an hour." That is certainly a gem. The best of it is, so convinced are the great majority of newspaper readers of the wonderful powers of electricity to do anything and everything, that nine out of ten who read the remarkable sentence quoted would believe it.

* * *

An interesting light is thrown upon the honesty of purpose of the daily papers which have done so much towards fomenting the scare about the "deadly wires." Dr. Van der Weyde recently addressed a letter to the *Electrical Review*, pointing out the absurdity of some of the statements that have recently been going the round of the press. He said that he first sent the letter to three of the dailies, wishing to publish it before the matter cooled, but it was declined by all three. One editor sent a polite note saying that he could not publish the article as it was in total opposition to the views advocated by his as well as by the other daily papers; he added that he could not refute Dr. Van der Weyde's arguments as he considered them perfectly sound and correct, but that the daily papers had to be guided by the public feeling in the matter. Comment is superfluous.

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ANNALS
—OF—
Electricity, Galvanism, Magnetism and the Telegraph.

Electricity, *elektron, electrum*, meaning amber, from *helko*, to draw, in reference to its property of attracting light bodies.

Galvanism, from Galvani, the name of its discoverer.

Magnetism, *magnes*, the natural magnet, loadstone or lodestone, found abundantly near Magnesia, in Lydia. It is said that Magnes, a Greek shepherd, observed the attractive power of the loadstone on his metallic crook, and that the Greeks obtained the stone from Magnesia as early as 1000 B. C.

Telegraph, *tele*, afar off, *graphein*, to write, an apparatus for communicating intelligence rapidly at great distances.

(*Continued from page 16.*)

1160.—EUSTATHIUS, Archbishop of Tessalonica, relates in his commentary of the Iliad of Homer, that Walimer, the father of Theodoric, used to emit sparks from his body.

1195.—GUIOT DE PROVENCE writes, in a poem entitled *La Bible*, that prior to this date mariners made use of a "touched" needle, which was fixed upon a small piece of straw, for a compass.

1207.—NECKHAM (Alexander), Abbot of St. Mary's, alludes, in his *De Utensilibus*, to a needle placed upon a pivot, which indicates the mariner's course when the polar star is hidden.

1242.—According to KLAPROTH (Heinrich Julius Von), an eminent German Orientalist, the captains navigating the Syrian seas, at this period, used for a compass a common sewing needle, which had been magnetized and which was allowed to float on the surface of the water after being passed through a small piece of reed or cork.

1260-1295.—VENUTUS (Paulus) (Marco Polo) brings the compass from China to Italy.

1269.—ADSIGER (Peter) thus alludes to the declination of the magnetic needle, and to an azimuth compass having a needle mounted on an axis, in a Latin letter, now to be found in the Leyden University: "Take notice that the magnet, as well as the needle that has been touched by it, does not point exactly to the poles, but that the part of it which is reckoned to point to the south declines a little to the west, and that the part which looks toward the north inclines as much to the east. The exact quantity of this declination I have ascertained, after numerous experiments, to be five degrees.

1320.—GIOJA (Flavio de), an Italian pilot, born near Amalfi, is said to be the inventor of the mariners' compass. He first suspended the needle upon a pivot, leaving it free to move in any direction, and thus permitting of more ready and exact observations than when floating upon the water. The N of his compass was marked with a *fleur de lys*, in honor of the sovereigns of Naples, a branch of the royal family of France.

1492.—COLUMBUS (Christopher), the discoverer of America, is first to ascertain *the variation of the variation* of the magnetic needle, i. e., that the variation is not a constant quantity, but varies in different latitudes. Irving thus explains the discovery in the first volume of his "History of the Life and Voyages of Columbus:"

"On the 13th of September, 1492, he perceived about nightfall that the needle, instead of pointing to the North Star, varied about half a point, or between five and six degrees, to the northwest, and still more on the following morning. Struck with this circumstance, he observed it attentively for three days, and found that the variation increased as he advanced. He at first made no mention of this phenomenon, knowing how ready his people were to take alarm; but it soon attracted the attention of the pilots, and filled them with consternation. It seemed as if the laws of nature were changing as they advanced, and that they were entering into another world, subject to unknown influences. They apprehended that the compass was about to lose its mysterious virtues; and without this guide what was to become of them in a vast and trackless ocean? Columbus tasked his science and ingenuity for reasons with which to allay their terrors. He told them that the direction of the needle was not to the polar star, but to some fixed and invisible point. The variation was not caused by any failing in the compass, but by the movement of the North Star itself, which, like the other heavenly bodies, had its changes and revolutions, and every day described a circle round the pole. The high opinion that the pilots entertained of Columbus, as a profound astronomer, gave weight to his theory, and their alarm subsided."

1500.—VESTOMANNUS (Ludi) reports having seen a pilot in the East Indies directing the course of his vessel by a magnetic needle, which, from the description, was arranged like those in use at the present day.

1544.—HARTMANN (Georg), a vicar of the church of Saint Sebaldus, at Nuremberg, writes, March 4, to the Duke Albrecht of Prussia, as follows: "Besides, I find this also in the magnet, that it not only turns from the north and deflects to the east about nine degrees, more or less, as I have reported, but it points downward. This may be proved as follows: I make a needle a finger long, which stands horizontally on a pointed pivot, so that it nowhere inclines towards the earth, but stands horizontal on both sides; but, as soon as I stroke one of the ends (with the loadstone), it matters not which end it be, then the needle no longer stands horizontal, but points downward (*fällt unter sich*) some nine degrees, more or less. The reason why this happens was I not able to indicate to his Royal Majesty." The above seems to establish the fact that Hartmann first observed the dip of the magnetic needle.

1553.—PORTA (Giambattista della), Italian natural philosopher, alludes, in his *Magiae Naturalis*, chapter XXI., to experiments made with the magnet as a means of telegraphing.

1576.—NORMAN (Robert), an ingenious artificer and a manufacturer of compass needles at Wapping, near London, discovers, independently of Hartmann, that after the needles are magnetized they appear heavier at the northern end and constantly dip with the north end downwards. Four years later he publishes a pamphlet, "The Newe Attractive, showing the Nature, Propertie and manifold Vertues of the Loadstone, with the Declination of the Needle touched therewith, under the Plaine of the Horizon. . . . " In the fourth chapter of his work he describes the mode of making the par-

ticular instrument with which he was enabled to establish the first accurate measurement of the dip, "which for this citie of *London*, I finde by exact observation to be 71 degrees 50 minutes."

1581.—Burroughs, Comptroller of the English Navy, is the first to publish well-authenticated observations on the variation of the compass.

1590.—Cæsar (Julius), a surgeon of Rimini, observes the conversion of iron into a magnet by position alone. This effect was noticed on a bar which had been used as a support to a piece of brickwork erected on the top of one of the towers of the Church of Saint Augustin.

1600.—Gilbert (William), of Colchester, physician to Queen Elizabeth of England, justly called by Poggendorf "The Galileo of Magnetism," publishes his great work, *De Magnete Magnetisque Corporibus, et de Magno Magnete Tellure*, containing almost everything concerning magnetism which was known during the two following centuries. Its first chapter treats of magnetism and the second of electricity. The distinction between the two he establishes as follows:

"The difference between magnetic and electric force is, that all magnetic bodies attract by their mutual strength, while in electric bodies the electric attracts only; the body attracted is not changed by its natural force, but is drawn spontaneously by the nature of the material of which it is composed. Bodies are drawn toward electric bodies in a straight line toward the center of electricity; but the magnet attracts the magnet only at the poles directly, at other points obliquely and transversely, even as they adhere and hang together. Electric motion is the motion of an accumulation of matter; magnetism, of arrangement and order. The globe of the earth is collected, and coheres by electricity. The globe of the earth is directed and moves by magnetism, and at the same time it also coheres and is welded together in its inmost parts, so that it becomes solid."

To Dr. Gilbert we owe the word *electricitas*, electricity, derived, as we have already seen, from the word *elektron*, and he is, likewise, the first to show that stones, glasses, resins, etc., can be electrified by friction, as amber is, and can be made to attract heavy as well as light bodies.

1600.—Schwenter (Daniel), under the assumed name of Johannes Hercules de Sunde, describes, in his *Steganologia et Stezanographia*, the means of communicating intelligence at a distance by means of two compass needles circumscribed with an alphabet, the needles being "diamond shape, from the same piece of steel and magnetized by the same (bar) magnets."

1617.—Strada (Famianus), an Italian author and Jesuit priest, publishes his curious *Prolusiones Academicæ*, wherein he describes [Lib. II., Prol. VI.] a supposititious contrivance of two magnetic needles attached to dials bearing a circle of letters, and which possesses the property of always indicating the same letter, so that when one needle is made to point to any particular letter upon one dial the other needle, however distant at the time, places itself so as to point to the same letter upon the other dial.

1622.—Gunter (Edmund), Professor of Astronomy at Gresham College, discovers the change of declination.

1628.—Leurechon, a student belonging to the order of Jesuits, publishes, under the name of Van Elten, the *Récreations Mathématiques*, in which he alludes to the reported transmission of intelligence by the agency "of a magnet or other like stone." He adds: "The invention is beautiful, but I do not think there can be found in the world a magnet that has such a virtue."

1630.—Gassendi (Pierre), an eminent French savant, while provost in the Diocese of Digue, discovers that part of the iron cross of the church of Saint Jean at Aix possesses all the properties of a loadstone after it has been struck by lightning and has lain in one position a certain length of time.

1632.—Galileo (Galileo Galilei), Italian philosopher and mathematician, publishes, in Florence, his celebrated *Dialogo sopra i due massimi sistemi del mondo tolemaico e copernicano*, from which is extracted the following passage:

"*Sagradus:* You remind me of a man who offered to sell me a secret for permitting one to speak, through the attraction of a certain magnet needle, to some one distant two or three thousand miles, and I said to him that I would be willing to purchase it, but that I would like to witness a trial of it and that it would please me to test it, I being in one room and he in another. He told me that at such a short distance the action could not be witnessed to advantage, so I sent him away and said I could not just then go to Egypt or Muscovy to see his experiment, but that if he would go there himself I would stay and attend to the rest in Venice."

1635.—Cabæus (Nicolas), of Ferrara, alludes, in his *Philosophia Magnetica*, to the possibility of two persons communicating intelligence by means of magnetized needles.

1644.—Descartes (René), a prominent French philosopher and mathematician, publishes his *Principia Philosophiae*, in which he propounds his long-accepted theory of vortices. His idea was that a rush of subtle porous matter passes rapidly through the earth from the equator towards each pole, and is opposed by magnetic substances during its passage; that the sun is the center of a vortex of an ethereal fluid, whose whirling motion produces the revolution of planets about the sun, or around the fixed stars, as well as other phenomena. This theory, which found many believers, even after Newton's discoveries, has long since been consigned to oblivion.

1650.—Bond (John) discovers the true progress of the deviation of the compass.

(*To be continued.*)

—A more complete transformation than is generally seen in Rubber Works, is about to take place in the already very extensive plant of the Boston Belting Company, at Roxbury, Mass. The old style machinery is to be largely replaced by new and improved designs, while the additions embrace several very large hydraulic presses, some novel tubing machines, condensers for engines, and an array of steam boilers, representing in the aggregate fully 1,000 horse-power. The entire works are now ready to be lighted with the Edison Incandescent Safety Lamps, and the whole establishment will be further protected from fire by twelve hundred Grinnell Sensitive Automatic Sprinklers. It is estimated that the capacity of these works will be increased fully forty per cent., under the continued effective management of Mr. James Bennett Forsyth, manufacturing agent and general manager. This gentleman has our thanks for a fine cherry-wood framed engraving of his company's works at Roxbury.

U. S. Imports and Exports During the 11 Years Ending June 30, 1888.—Specie Values.

	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.
IMPORTS— VALUES.—(In dollars.)											
FREE OF DUTY—India rubber and gutta percha crude..	4,711,102	6,068,088	9,606,229	11,054,949	14,264,903	15,511,066	13,736,004	9,095,256	11,888,192	13,756,783	16,067,262
DUTIABLE—India rubber and gutta percha, Mfres. of...	242,564	174,137	312,051	187,203	222,024	333,236	328,137	231,166	233,582	266,031	343,208
QUANTITIES.—(In pounds.)											
FREE OF DUTY—India rubber and gutta percha crude..	12,512,203	14,878,584	16,826,099	20,015,176	22,712,862	21,646,320	24,574,025	24,208,148	29,263,632	28,649,446	36,628,351
EXPORTS OF DOMESTIC MERCHANDISE— VALUES.—(In dollars.)											
India rubber and gutta percha Mfres. of boots and shoes	29 804	20 225	28 072	37,437	27,622	36,874	57,047	89.216	74,947	81,190	77,078
All other	275,963	268,889	278,608	363,097	483.094	532,422	577,999	506,940	589,357	753,114	789,789
Total	305,767	289,114	306,680	400,534	510,716	569,296	635,046	596,156	664,304	834,304	866.867
QUANTITIES.—(In pairs.)											
India rubber and gutta percha, manufactures of: boots and shoes	16,009	12,954	13,980	25,890	19,899	26.6'0	47,240	84,183	60,553	86,166	71,025
EXPORTS OF FOREIGN MERCHANDISE— VALUES.—(In dollars)											
FREE OF DUTY—India rubber and gutta percha crude..	183,862	39.952	4,520	271,642	464,014	1,290.378	297,788	204,109	54,779	321,514	182,870
DUTIABLE—India rubber and gutta percha, Mfres. of...	3,949	7,119	6,282	7,065	187	4,845	2,791	3,412	3,116	1,428	1.263
QUANTITIES.—(In pounds.)											
FREE OF DUTY—India rubber and gutta percha crude..	594 260	112,835	7,426	488,549	1,092.869	1,615,071	539.947	460,316	119,924	638,317	372,731

U. S. Imports by Countries During the Two Years Ending June 30, 1888.

NAMES OF COUNTRIES FROM WHICH IMPORTED.	INDIA RUBBER AND GUTTA PERCHA CRUDE. Free of Duty.				INDIA RUBBER AND GUTTA PERCHA MANUFACTURES. Dutiable.	
	1887.		1888.		1887.	1888.
	Pounds.	*Dollars.*	*Pounds.*	*Dollars.*	*Dollars*	*Dollars*
Austria-Hungary					1,009	567
Belgium					212	33
Brazil	16,882,933	8,279,194	24,468,294	10,811,952		
Central Amer. States:						
Costa Rica	92,405	42,131	62,455	28,431		
Guatemala	274,722	129,446	300,668	151,749		
Honduras	148,221	79 465	227,963	120,854		
Nicaragua	1,575.837	836,004	1,545,121	768,743		
San Salvador	58,748	17,844	62,001	22,683		
Chili					25	
China					62	264
Denmark					31	
Ecuador	1,074 081	476,949	856,933	327,477		
France	231,792	127,239	220,285	107,460	38,320	40,648
French Possessions in Africa and adj. isl'ds	10,529	3,629	14.221	4,925		
Germany	815,353	324,867	693.384	229,844	79,861	178,110
England	4,343,339	2,066,231	4.342,392	1,916,790	141.504	118,822
Scotland					1,858	1,098
Ireland						17
Nova Scotia, N. B., and P. E. Islands					142	101
Quebec, Ontario, Manitoba and the N. W. Ter.			5,064	1,799	2 592	2,402
British Columbia					100	98
Newf'ndl'nd & Labrador					44	
British West Indies	49,194	25,686	14,865	7,659		
British Guiana	1,035	373	6,319	2,397		
British Honduras	45,563	26,057	38,157	19,254		
British East Indies	632,835	229,744	802,385	290,738		
British Possessions in Africa and adj. isl'ds	24,758	9,406	28,694	8,532		
British Posses., all other	13,160	6,653	2,048	972		
Italy					3	
Liberia	341	85	1,203	300		
Mexico	313.048	141.147	305,755	131,224	24	106
Netherlands	283,738	126,758	482,730	229,078	4	166
Dutch Guiana			198	36		
Dutch East Indies	122,032	40,222	461,374	131.600		
Portugal	111,750	51,243	367,915	189,035		
Portuguese Posses. in Africa and adj. isl'ds	23,482	10,449				
Spain	902	470				
Cuba	5,348	250	9,743	176	9	
Switzerland					47	
Turkey in Europe						776
Turkey in Asia					184	
U. S. of Colombia	898.110	420,929	919,408	388,601		
Venezuela	34,322	15,645	42,826	22,686		
All other countries and ports in Africa	575,389	269,067	351,952	182,820		
Total	28,649,446	13,756,783	36 628 351	16,067,262	266,031	343,208

—It is expected that the new mill of the Woonsocket Rubber Company will be completed within the next sixty days. Allen & Son, of Worcester, have supplied it with ten new boilers of 150 horse-power, which it is intended to run continually under 125 pounds steam pressure. The machinery is to bedriven by two compound tandem condensing Corliss engines, each of 750 horse-power.

U. S. Imports by Customs Districts During the Two Years Ending June 30, 1888.

NAMES OF CUSTOMS DISTRICTS INTO WHICH IMPORTED.	INDIA RUBBER AND GUTTA PERCHA CRUDE. Free of Duty.				INDIA RUBBER AND GUTTA PERCHA MANUFACTURES. Dutiable.	
	1887.		1888.		1887.	1888.
	Pounds.	*Dollars.*	*Pounds.*	*Dollars.*	*Dollars*	*Dollars*
Alaska, Alaska					96	98
Baltimore, Md	24 314	15,241			4,912	4,545
Bangor, Me					60	
Boston & Ch'l'st'n, Mass.	1,933,043	900,693	3,119,052	1,034,925	40.758	37.935
Buffalo Creek, N. Y.					67	538
Champlain, N. Y.					49	35
Chicago, Ill.					2,190	5,052
Cincinnati, Ohio					1,457	608
Corpus Christi, Texas					7	15
Cuyahoga, Ohio					72	
Denver, Colo.					395	106
Detroit, Mich.					151	378
Duluth, Minn.					7	
Fairfield, Conn.						207
Galveston, Texas						6
Genessee, N. Y.					40	28
Georgetown, D. C.						55
Hartford, Conn						15
Huron, Mich.					25	
Indianapolis, Ind					27	100
Kansas City, Mo.						4
Key West, Fla					1	
Louisville, Ky						277
Minnesota, Minn					183	236
Mobile, Ala			120	27		
New Haven, Conn						16
New Orleans, La	394,135	215.396	723,977	304.232	18	97
New York, N. Y.	26,236,065	12,604,500	33,741,151	14 742 162	191,256	267,741
Niagara, N. Y.			5,064	1,799		
Norfolk & Portsm'th, Va.			150	105		
Oswegatchie, N. Y.					34	67
Paso del Norte, Texas and New Mexico					2	91
Philadelphia, Pa.	60,647	20,002	26,909	9,087	17,774	20,304
Pittsburg, Pa.					44	58
Portland & Falmouth, Me.					32	
Providence, R. I.					45	140
St. Louis, Mo.					1,240	1,274
San Diego, Cal.					15	
San Francisco, Cal.					1,876	1,841
Savannah, Ga.						5
Teche, La.	2,242	951	11,928	4,875		
Vermont, Vt.					2,154	1,334
Willamette, Oreg.					76	
Total	28,649,446	13,756,783	36,628,351	16,067,262	266,031	343,208

United States Customs Decisions.

RUBBER GOODS.—Assessment, by Collector at New York, at 35 per cent. *ad valorem* on so-called india rubber fabrics, classified as manufactures, of which cotton is the material of chief value.

WEBBING.—Assessment, by same Collector, at 35 per cent. *ad valorem* on webbing, composed of cotton and india rubber, classified as cotton webbing.

RUBBER SHOES.—Assessment, by same Collector, at 25 per cent. *ad valorem* on so-called old rubber shoes, classified as india rubber shoes.

"Wrinkles."

HAPPENING into the office of one of the most progressive of the rubber manufacturers, we saw the junior partner with the October number of THE INDIA RUBBER WORLD in his hands, and as luck would have it he was reading the first instalment of "Wrinkles." We sat beside him and awaited his verdict, with more than ordinary interest. It soon came.

"Look here," he called to the senior partner, "here is a fellow giving away the whole inside of our business. Why, pretty soon he will be quoting compounds, and *then* where will we be?"

"Just so," replied the other; "every blessed customer that we have will be buying a six thousand dollar calender and running their own goods in a year, and rubber mills will be a thing of the past."

The jolly laugh that accompanied these statements was eloquent evidence that the secrets of the rubber business are secrets of keen buying, careful management, push and business ability, rather than the possession of a few jealously guarded formulæ, that, once discovered, give free entrance to the general public. Reinforced by this view, we continue to smooth out the wrinkles, that "he who runs may read."

A letter came to us this week that took us back some years when the wringer-roll business was in its infancy, and when as a boy we worked under a foreman, whom we then thought to be one of the best equipped of any in the business. He is old now, and not over-rich, and he writes: "Can't you get me a place in some factory where they make a specialty of sticking rubber to iron? You know that is my hobby." Yes, we know it is his hobby, and the memory of the manner in which he did it comes back with a rush of pity. His hobby was *blood!* We hasten to explain, lest the reader think our wits have suddenly flown. After the shaft had been cleaned and polished with powdered pumice-stone, it was rubbed over with a piece of raw liver, allowed to dry, and then covered with rubber and vulcanized. This sanguinary procedure was, strange to say, sometimes successful, but not more so than was the stick of the hand-made tubing that was meant to slip from the wires easily, and which *sometimes* stuck so that we blistered our hands with work and seared our lips with violent expressions before the rubber "slipped." Yes, that was his hobby, but the "wrinkles" that have been made the subject of patents and patent fights, and that really stick the rubber every time to the iron—all these are a sealed book to him, and he takes no stock in them. If you were to talk to him of blue vitriol, of chemical combinations, or the like, he would turn away in disgust and demand blood. However, he has boys who are "up and coming" in the business, and who are willing to absorb new ideas, and, without being aware of it, he has bequeathed his progressiveness to them and given out his whole stock, as the rest of us will do some day when we grow old-fogyish.

Speaking of roll-covering, one of the most genial of the rubber men of the "old school," and a man brim-full of progress, too, was telling me of an experience of his own. He had been covering shafts with cement, then with rubber, and, after the most careful drying, vulcanized them. On the subject of drying the cement he was exceedingly particular, for he knew that a very little benzine (I am not sure but the solvent was camphene in those days) would cause blisters. His constant care made him quite successful in his line, and he often congratulated himself on it, until one day he visited another factory where they did the same sort of work. As a matter of course, he was interested, and, watching them at work, was horrified to see that they slapped the cement recklessly upon the shafts covered it up at once, and ran it into the vulcanizer without the least pretence of drying. With bated breath he inquired about blisters. "Never have any," was the astounding reply, and they didn't. Returning home, the same manner of proceeding blistered the rolls until they were fairly honey-combed. Now, why this should be so I don't know, and am free to confess would like to have it explained, as I would another instance of a similar nature.

This similar case is the experience of a rubber shoe manufacturer. He formerly used a little rosin to give a nice surface, and also to give the stock a good grip on the cloth. After a time his goods got a habit of "silvering." He left out the rosin and it stopped. Now, in the next factory they used a compound just like his and never had any trouble. His stock cured in their heaters came out all right, and in his it insisted on "silvering." Numberless experiments were tried by both to discover the wherefore of this, but to this day it has never been satisfactorily explained. As they could not settle it we leave it an open question: Was it in the heater? Or was it in the compounding?

Were I manufacturing rubber goods again, I should make it a point to have at least one genuinely lazy man in my employ. The smartest man that ever lived isn't a patch on the loafer for getting up simple expedients for saving work. What if it be shirking? It's a short-cut, and is valuable, and sure to be practical. The ancient method of "tumbling" bulbs and tubing and all kinds of white goods in a barrel that carried sand and pumice-stone did the work. The emptying of the barrel, the cleaning of the goods after they were "tumbled," and the working in the fine cutting dust that flew everywhere, was a disagreeable job until a lazy man discovered that the goods needed no help in grinding. Shaken up together, they received a better finish than in the old way, and so another "wrinkle" was added to the long list that rubber men know.

There was a time when a hard-rubber man would have scoffed at the idea of using Madagascar rubber, but now they swear by the polish it takes, and feel blue when the supply runs low. The first man who had a sheet of hard-rubber come out of the heater a beautiful olive green, when he wanted a jet black, was a long time in learning that the rubber had not been thoroughly dried, and I warrant it took him a still longer time to discover that a dip in bisulphide of carbon restored the black to the vulcanite.

A certain large, very large, mill in England stored their rubber—Fine Para—in a vast basement. In another portion of the same room they kept a great many casks of palm oil. It so happened that a local flood—this happened after the Deluge—filled the basement with water, and when the trouble was over it was found that the palm oil casks had burst open and covered the leaves of rubber with a fine coating of oil. When this was discovered a consultation of the dignified heads of the house was held, and as a result a force of men was set at work, who with keen knives pared off a thin slice of the outside of each rubber cake and cast it away. The job was just finished when an American rubber man called at the office, and to him was told the unfortunate happening, which was made the more doleful by the intelligence from the head book-keeper that the "paring" had cost a number of thousand pounds. The story finished, the Yankee said:

"There is one little 'wrinkle' that almost any old woman in the States knows, that would have helped you amazingly in this case. Soda and palm oil makes the best soap in the world. If you had put the rubber in barrels of water, added a few cents' worth of soda and rinsed the cakes a little, and then pounded off the soap suds, you would have gotten out of your scrape in Yankee fashion, and saved your thousands of pounds."

The Evolution of the Rubber Grinder.

UNTIL within the last half-dozen years rubber machinery has, in many respects, been confessedly crude. As the spirit of progress takes possession of the manufacturers, and they realize that success is to be attained through a systematic economy of materials and of labor rather than by secret processes, the factories are thrown open to visitors, and the crudities disappear. The one machine that all rubber mills use is the grinder—"mixing," "refining," "breaking-in" all are done upon it.

The first grinder of which we have any record was a machine made after the pattern of the "pug-mill" used in brick yards for the kneading of the clay. In this the rubber was treated with camphene to make it less refractory, so that the process was but partly mechanical.

The next step was the use of heavy wooden rolls set in a wooden frame, a solvent still being employed to soften the gum so that it

could be worked. From this it was not a long step to the iron rolls, which were found to wear much better, and were not affected by the camphene or benzine used in the sticky compound.

At this stage of the industry, it was discovered that heat softened the crude gum, and yet did not make it sticky as did the solvents. A practical application of this knowledge was the hollow steam-heated grinder-roll that was almost immediately produced, and that made possible "dry mixing."

A few of the first steam-heated grinders are still in existence, and are worthy objects of curiosity on the part of rubber men. These machines were invariably run by belts, a huge wooden frame standing by the side of the machine in which hung a fast and loose pulley. The pulley shaft was provided with a large gear that ran into a pinion set near the floor. This pinion was on a shaft that ran across the back of the grinder, and at its extreme end held another pinion, which in turn, engaged with the large gear that turned the front roll. A similar shaft ran under the front of the grinder, and taking its power from the driving gear of the front roll by means of its pinion turned the back roll. It will be seen that the power went entirely around the grinder before it was applied. This "boomerang" pattern, with endless modifications, continued to do its shiftless work for many years. It was a slow-running, lazy machine, mixing batches of twelve and fourteen pounds, and making a horrible clatter with its many gears, and an ear-splitting noise with its shrieking belt.

Little by little the needs of the mills drove the manufacturers to make improvements. In this they were assisted by a few large machine builders who, learning what was needed—in many cases with difficulty—set themselves to build a practical, economical machine. The first thing they did was to throw aside the belted arrangement and put in a floor shaft. Then they hung a pinion on that shaft, and made it run one roll, while gears on the further necks of both rolls made one run the other. In the next place, the machine was enlarged, the castings made heavier and the speed increased. As a result, one hundred-pound batches became common, and one of the new machines accomplished as much as a dozen of the old.

With all of this advancement in the manner of mixing, the "mixers" still stood in front of their respective machines, and with shovel and brush collected the "compound" that fell down into the pan and lifting it up, a shovel-full at a time, fed it between the rolls. It remained for a rubber superintendent to do away with this last crudity, and to make the grinder feed itself. He called his attachment the automatic rubber mixer. Described briefly, it is a short endless belt of duck and rubber running horizontally under the grinder, and occupying the place usually taken by the "compound box." The upper surface of the belt when in use is drawn against the face of the "back-roll," and brought up even with the top of the machine, where it is held by strong springs. The turning of the roll sets the belt in motion, which results in the constant and even delivery to the top of anything that drops below the rolls. When a "batch" is thoroughly mixed, the belt may be dropped down out of the way, and the piece "refined" with as much ease as if no belt were there.

The great advantage of this attachment is obvious when it is considered that one man can easily run these grinders where it formerly took three men to run them. In addition to this, each grinder will deliver per day one-fourth more finished stock, and of a far better quality. By the evenness of the feeding, the finished "batch" is always absolutely homogeneous, a most necessary condition, and one heretofore dependent upon the skill or faithfulness of the workman.

How Stockinet Dress Shields are Made.

THE dress shield, but a few years ago a novelty, has become an indispensable accessory to ladies apparel, and its use is constantly increasing. An indication of this is the fact that of late some of the largest and most enterprising rubber manufacturers have turned their attention to this class of work on a large scale, and are making shields by the thousand gross, while the demand keeps far ahead of the supply. The style, shape and quality of these goods varies greatly, and embraces some, which unfortunately are dress destroyers rather than "dress protectors." In this article we shall treat only of the Seamless Stockinet variety, which has stood the test of time, and has given good satisfaction.

These shields have been known for about seventeen years. The first, produced in Brooklyn, N.Y., were thick, clumsy and ill-smelling, the rubber being similar to the ordinary shoe compound, spread on stockinet. It was soon greatly improved until they reached a perfection very nearly akin to that of the present day. The manner of manufacturing seamless shields is in all cases essentially the same, that is, in order to form the curve the material must be stretched or crimped. This may be done in the old-fashioned way of pulling the net by hand over tin forms, or by pressing it between heated plates. Of the latter there are six varieties, used by as many different manufacturers, and in every instance there must be a form to correspond to the curve of the shield. The "stock" is prepared as follows: the cloth, and that furnished by a prominent Pawtucket, R. I., manufacturer has given the best satisfaction, is thoroughly dried, after which it is ready to be crated. This must be carefully done, and in a way peculiar to this work, or bad results will follow, as for instance the goods will be too hard, or they may be porous or the gum may peel from the cloth. Porosity is perhaps the most troublesome of these faults, and is caused by the thin layer of gum being cut by inequalities in the surface of the stockinet, which are apparent only after the "stretching." The manner of coating is in no way like coating stockinet for shoe work, where it is to a certain extent pressed into the cloth in calendering. On the contrary, the gum is only a trifle more than laid on, and is expected to adhere, from the fact of its being wound up in rolls of about two hundred and seventy-five yards each, and left in that shape for a week. A very good compound for this work, or one from which excellent results have been obtained is as follows:

20 lbs. Fine Para.
11 lbs. French Oxide of Zinc.
6½ lbs. Paris White.
5½ oz. Litharge.
1 oz. Golden Sulphuret of Antimony.
1½ lbs. Sulphur.

In calendering as we have already indicated, the stockinet is passed through the rolls as in other work, with this exception, the tension is necessarily very slight. The "drubling" is done on a heated folding drum which revolves at the same speed as bottom roll of the calender. The net, as it comes through with the rubber spread upon it, is passed under a series of rollers which lie against the face of the drum, where it is joined to the "drubling net" which comes from a roll suspended above. It is then wound up like any ordinary stock and sent to the cutting room. There it is laid upon a table, fifty thicknesses together, and fed through a powerful press, where it is "blanked out" in oval shapes and is then ready for the "crimpers." The old-fashioned way of crimping was to pull the material by hand, over flat tins, which had seven sharp pins around the edge. This was done by girls who at best could not handle more than six gross a day, while it took a half day in addition to remove the shields from the forms after being vulcanized. The curing was done in a dry heater, the goods being placed fifty gross at a time on racks and subjected to 250° of heat for two and one-half hours, or less, according to the quality of stock used. This process although apparently crude is still in use by manufacturers here and abroad. The more modern methods of vulcanization are better and cheaper and show the same improvement that the "making up" displays. A patented process as used by one of the pioneers in rubber manufacture in this country is the best on this side of the Atlantic. It consists, briefly, in placing the oval-shaped "blank" which is to become a shield between steam-heated, corrugated plates, so made as to stretch the net evenly all around the outer edge. The middle is meanwhile rigidly held by the "male former" and the matrix—its pressure giving the desired curve. When taken out of this tiny press it is folded together, ironed, pinked and a most perfect shield

is the result. In this process the "cure" runs all the way from ten seconds to a minute. A machine invented by a Frenchman comes next to that just described in its possibilities for doing good work. It may be described as two hollow, adjustable, steam-heated blocks, the upper parts rounded off convexly, with barely room enough between the two to allow the introduction of a curved form upon which is the shield "blank." The cure in this apparatus is also much quicker than in the "dry heater," and it may be said of the apparatus that it is the only one which has thus far produced a shield from inelastic cloth. The "scallop" on all dress shields is produced in a power press, fitted with a die to correspond to the size of the shield, after which they are deodorized, a process consuming twenty-four hours. The process is of impregnation with some delicate perfume; stamping and boxing follow and the perfected shield is ready for market.

Review of the Markets.

SINCE our last issue, prices of all descriptions of rubber have advanced steadily, in response to a well-sustained demand from all quarters, and, at the time of writing, fine new Para is quoted 71-72c., and coarse, 50-55c. The total stock has been further reduced to about 700,000 pounds of all descriptions, which is a smaller figure than any known since the latter part of 1885, notwithstanding the fact that the receipts have continued throughout upon a fair average scale. In all departments of manufactured goods, business is reported brisk, and the near approach of the winter season renders very flattering the prospects in nearly every branch of the trade.

Mr. Simpson, of Simpson & Beers, New York, dealing exclusively in rubber paper, informs us that but little has of late been done here in this line, owing to the unusual stringency prevailing in the money market, but that a comparatively fair business has been transacted by several banks outside of the city.

Crude gutta percha is still very strongly held, mainly owing to the reported increased demands for good grades adapted to the covering of ocean cables. Gutta percha tissue naturally sympathizes with the strength developed in the crude gum, and prices range now from $1.55-$1.60, as against $1.15-$1.25 in May, and $1.00-$1.05 end of past year.

We quote:

Para, fine	71-72
Para, medium (Entrefine)	70
Para, coarse (Negrohead)	50-55
Caucho (Peruvian), sheet	45
Caucho (Peruvian), strap	50
Ceara, No. 1	35
Ceara, No. 2	30
Ceara, No. 3	15
Mangabeaira, sheet	40
Mangabeaira, liver	37
Esmeralda, sausage	53-55
Esmeralda, strip	48
Guayaquil, strip	40-42
Panama, strip	35-37
Columbian, sausage	60
Columbian, strip	53-55
Carthagena, strip	33
Carthagena, slab	....
Nicaragua, scrap	52-53
Nicaragua, sheet	48—
Mexican, strip	47—
Mexican, sheet	....
Guatemala, sheet	....
Thimbles	40-49
Tongues	35-37
Loando	....
Sierra Leone	35-44
Benguela	39
Niger	....
Congo	39-42
Gaboon	....
Cameroons	34
Magyumba	34
Small Ball	38
Large Ball	38
Soft Ball	36
Calabar	34
Accra	30
Liberian	28
Flake, Lump and Ord	23-26
Mozambique, spindles	44
Mozambique, red ball	50
Mozambique, white ball	42
Mozambique, barky, unripe	....
Mozambique, low heated	....
Madagascar, pinky	60
Madagascar, black	44
Assam, No. 1	55
Assam, No. 2	....
Assam, No. 3	....
Rangoon, No. 1	53
Rangoon, No. 2	....
Rangoon, No. 3	....
Batavia	50
Borneo	35-40
Ballata	....
Chicle	30-33
Tuno	8-35
Gutta percha, fine grade	1.50-2.00
Gutta percha, medium	90-1.00
Gutta percha, hard white	75-85
Gutta percha, lower sorts	35-40

Free Want Department.

Manufacturers in need of Managers, Superintendents, Foremen and help generally, are invited to make free use of this Department; and all persons seeking situations in the rubber or electrical trades, are cordially invited to do likewise. Advertisements of Machinery and Supplies Wanted will also be inserted free of charge. And, in all cases, if the first insertion of the advertisement does not accomplish the desired end, its repetition is desired by us.

WANTED—By a man thoroughly posted in the manufacture of rubber boots and shoes, clothing, etc., a position as foreman of mixing and calendering. Best of references as to ability and success in the past. Address "B," INDIA RUBBER WORLD.

WANTED—Small Second-hand mixing mill, 12x8, must be in good condition. Address "M," INDIA RUBBER WORLD.

WANTED—In a large manufactory of mechanical rubber goods a man as assistant superintendent, who has experience and lots of push. Must be a worker from the word "go," and will secure pay accordingly. Address "B. A," INDIA RUBBER WORLD.

WANTED—Situation by an engineer who understands the setting of rubber machinery, piping, etc., and has been accustomed to all sorts of jobbing about a rubber mill. Good references. Address "G," INDIA RUBBER WORLD.

WANTED—Situation by a first-class calender man, after January 1, 1890. Is thoroughly posted on fine work. Address "H," INDIA RUBBER WORLD.

WANTED—A mixing or grinding mill for reducing vulcanized scrap to powder. Address "O. O," INDIA RUBBER WORLD.

WANTED—By a manufacturer of a full line of the best mechanical rubber goods, a traveling salesman for the state of Pennsylvania. Must be a first-class man in every respect. Address "A," INDIA RUBBER WORLD.

FOR SALE—One mixing mill Rolls, 30x12. Driving gear 48-inch, 12-inch face. Another 36x12. Driving gear 4 feet 8 inches, 5-inch face. One roll in latter is broken. Terms very reasonable. Address "K," INDIA RUBBER WORLD.

FOR SALE—Vulcanizer almost new, 4x12 feet; cost, $300; price, $150. Address "D," INDIA RUBBER WORLD.

FOR SALE—Several second-hand mixing mills. All in good order. Prices, etc., on application. Address "N. E," INDIA RUBBER WORLD.

WANTED TO PURCHASE—Publications, treatises, law reports, etc., in any language upon India Rubber, Gutta Percha and allied products. Address DOCTOR, 114 *Tribune* Building, New York.

GEO. A. ALDEN & CO., COMMISSION MERCHANTS.—SEE PAGE XXI.